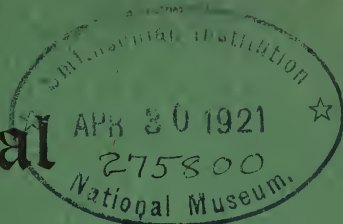


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The Journal

OF THE

EAST AFRICA AND UGANDA NATURAL HISTORY SOCIETY



FEBRUARY 1921

No. 16.

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REV. K. ST. A. ROGERS, F.E.S.

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ON A COLLECTION OF BIRDS FROM TURKANALAND

BY V. G. L. VAN SOMEREN, with Introduction by
CAPT. GEMMEL, *Survey Dept., attchd. 6th K.A.R.*

Before we come to the study of the wonderful and interesting collection of bird life contained in this article, let us have an idea of the road to the district from which the collection comes and the class of country we pass through. There are two main routes from Nairobi—viz., via Londiani, Eldoret, Kacheliba (a small administrative post on the north-east slopes of Elgon), and Moroto; or via Kisumu, Jinja, Namasagali, the Nile and Lake Kioga steamer service to Lale Port, Soroti, and on to Moroto.

The first-mentioned route is not the generally travelled one, as it entails a much longer period of *safari*, and the second is the one that concerns us. The journey from Nairobi by train and on to Jinja by the steamer *Clement Hill* will be already too familiar to the reader to need any further description. From Jinja you take the train again on the Busoga Railway to Namasagali, a port established as headquarters of the Nile-Kioga Lake Service. The distance is approximately 60 miles, and, generally speaking, the country is slightly undulating and scrubby with long grass. The railway follows the general line of the Nile, and at Namasagali the river is a fine wide stream. At Namasagali you embark on the steamer *Stanley*. To one unacquainted with Africa and her ways, you would have grave doubts when embarking, and would wonder in what depth of water you would finish up! but in reality the *Stanley* is very comfortable for travelling on the Lake and the Nile, and is just another instance of making the means meet the end.

To reach Lale Port, one has a trip right round Lakes Kioga and Kwania, touch at all the ports, the trip in general being very interesting—especially if the steamer is held up in the *sudd* for a few days and food runs short! Lale Port being

our present objective, we disembark there and say good-bye to most good things of life.

From Lale we trek to Soroti, a distance of 12 miles, with a good road suitable for motor-cycles. Here there is a pretty station with a most hospitable D.C. and A.D.C., and also a Medical Officer.

Porters for the *safari* to Moroto are arranged for here and are quickly forthcoming. All preparations being made for a six days' *safari*, we start and travel via Werra, Komolo, Katakwe to Adechal, which brings us to the end of our third day. This journey is through fairly thickly populated country inhabited by the Teso people. All along the road are shambas of cotton, matama, beans, and bananas. Between Soroti and Katakwe there are large areas of swamp country, and huge causeways are built up for the road. The country is mostly undulating and is timbered with light small trees, and covered with tall grass from 2 to 4 feet high.

The soil is mostly of a light sandy nature. At the camps mentioned there are comfortable rest-houses, built and maintained by the chiefs.

The distances are approximately: Lale to Werra, 16 miles; Werra to Katakwe, 16 miles; Katakwe to Adechal, 15 miles. Komolo is about 6 miles from Werra, but there is no rest-house there now, and a cotton ginnery is about to take its place.

From Adechal we travel on to Moroto, via Okwangazi, Matang, and Kangole. To all purposes Adechal is the end of the earth, and from here we leave the large native road and take to a small footpath.

The camps generally slept at are Okwangazi and Kangole, but the traveller needs to be careful going through here to enjoy the greatest comfort.

Firstly, all water vessels have to be filled, as the water supply at the next station cannot be depended on, especially during the dry season.

Having camped at Okwangazi, to water or otherwise, it is wise to make a very early start, say 4 A.M., for the next water, Matang. Rest there during the heat of the day, and then push on in the late afternoon to Kangole, for the night.

By doing this the *safaris* are equalised thus :—Adechal to Okwangazi, 16 miles ; Okwangazi to Matang, 17 miles ; Matang to Kangole, 5 miles (these two in one day), and Kangole to Moroto, 18 miles.

From Adechal to Matang no natives are met with, but near the latter place we come into the Karamojon, a tribe of unusually big, powerful people, with the finest native cattle I have ever set eyes on, and who cultivate matama for their larder.

The country between Adechal and Okwangazi is flat, and during the rains would be very soft and sticky, and is covered with scattered timber, mostly small mimosa and thick rank grass. The soil is generally described as black cotton.

From Okwangazi to Moroto the country is very similar, the prevailing timber being mimosa, but the grass is not so long. The soil is black cotton. Approaching Moroto the timber takes the form of belts of thorn bush about 6 to 8 feet high, and this is awful stuff to have an encounter with.

On the road from Adechal to Moroto there are some fine hills to be seen ; Mt. Kamalinga is a few miles south of Okwangazi, whilst always ahead looms up the huge outline of Mt. Moroto. Mt. Dabasain and the Suk Hill show up prominently to the south and south-east, and the Labor Hill in Karamoja are conspicuous to the north. Mt. Elgon is to be seen farther back towards Soroti.

When leaving Adechal we thought that we were leaving the haunts of man, and what a surprise awaited us when we reached Moroto Post !

We kept on climbing, and the farther we advanced so much farther the mountain seemed to retire, until thoroughly tired we suddenly came upon a large clearing in a big horse-shoe ravine, containing all manner of tents and grass huts. This we discovered to be the Base Hospital and stores of the K.A.R.s. On three sides the hills rise precipitously, and on the western side a good view is obtainable over all the Karamoja Plains. The ravine itself is thickly timbered. A fine stream, full of leeches, rises in the mountains behind the Post.

Hitherto, from Soroti we had been travelling in a north-easterly direction, but now we swing round and go practically

north, generally following the contour of the mountain. After about 10 miles we reached the Moroto River Camp ; another 5 miles on we came to where the road winds round like a snake and descends the escarpment.

The country round Moroto and the escarpment is covered with thick scrub and mimosa, and along the watercourses larger trees are seen. This area swarms with Francolin, Guineafowl, and small Buck. Small herds of Lesser Kudu also are in evidence.

Travelling on down the escarpment by various windings we come to a camp called Munyen, about 12 miles from Moroto River.

This district is now Turkanaland, and until the K.A.R. Expedition crossed its borders was practically unexplored. The country is very hostile and we were compelled to travel with armed escort. It was from this district that most of the birds were collected.

The change in climate and scenery was marked ; instead of the cool and fresh green of the escarpment, here we have nothing but miles of wait-a-bit scrub and sand, and loose sharp shingle.

At Munyen water is obtained from a deep rock-hole in the Kozibiri River, which fills up with the rains. From Munyen the road follows the Kozibiri up to Meuressi, where the Kozibiri joins the Turkwell, the latter being the main river of the country, coming down from Elgon. The various camps are Munyen, Nataparin, Nakurumunyen, Lorobumu, Meuressi, general direction from Munyen north-east. Distance from Moroto to Meuressi, 67 miles.

The water at the camping places is obtained by digging in the sand of the river-beds, but at about 2 miles from Nataparin Camp there is a fair area covered with salt springs, and to these in the dry weather come herds of elephant and rhino to drink. Around all the camps birds abound. It is a wonderful sight to see the sandgrouse coming to drink at sunset, they are literally in thousands.

At Meuressi there is a small K.A.R. post ; this was formerly the headquarters of the Turkana Force, but now the only signs of its greatness were the crowds of marabout storks,

eagles, and vultures, and such-like scavengers. A certain amount of game is to be seen.

The course of the Kozibiri River is interesting. When travelling along one cannot help but notice that either the river must have been very much bigger at some date or else it had altered its course. The present actual river-bed is well defined, but on either side for some distance up to a quarter of a mile there is heavy sand, as if deposited by the action of the water, and then there is a bank of about 6 feet up to the stone and shingle.

The present actual bed of the river winds about from side to side of this greater valley. The same applies to the Turkwell, only in a greater degree.

The next stage of the journey takes us to Kobua River at Rudolph. The camping grounds are Skull Camp, Lodwar, Kobua waterholes, and then on to Rudolph, about 61 miles.

The first two stages to Lodwar follow the Turkwell. Water is obtained by digging in the river-bed if the river is not running. Along the Turkwell there is a thick fringe of timber and scrub, and the country is sandy. Away from the river the country is all rough stony plain, covered with horrible thorny bush.

There is a fine outcrop of hill at Lodwar, running north-west and parallel to another river called the Kagwalla, this river rising on the north side of the Murissica Mountains. The prominent peak of this range is an important landmark and when climbing it appears to be nothing but a heap of volcanic shingle. From Meuressi to Lodwar the Turkwell runs practically north, but at Lodwar it takes a bend round to east and follows this general direction right on to Rudolph.

The Turkana in this district were aggressive and attacked a small patrol of Askaris one night. They didn't count on the sentry being awake! When he fired at them he killed two with one shot. The skulls of these two Turkana adorn the outskirts of the camp and give to it the name Skull Camp.

At Lodwar we leave the Turkwell and take to the desert track which runs to Kobua waterholes. This is a long waterless track and very hot, so we started at four in the afternoon and travelled all night, reaching the waterholes next morning.

The country is flat stony plain, covered with the eternal thorn bush.

Just a few miles before the waterholes we entered a low range of hills, running north and south, which extend from the Turkwell on the south up to the Labur Mountains, a distance of about 100 miles. Along the road they are about 8 miles wide.

The general direction Lodwar to Kobua waterholes is north-east. Kobua waterholes to Kobua River north-east by east.

The next morning we marched into Kobua Camp, which was at that time the headquarters of the Force. The scenery round the shore is improved by the presence of stately Dom palms, but farther back from the lake the same thick scrub and thorn bush is in evidence.

The soil here is sandy and covered with large numbers of shells, indicating that Rudolph must have covered this area at some remote time.

The great attraction at Kobua Camp is naturally the lake. We could not take our eyes off the beautiful expanse of blue water, especially after the country we had come through; and the breeze—well, I can only leave the reader to imagine it!

Upon our arrival we interrupted a battle royal between a scorpion and a tarantula. We found all the European officers, except those on patrol duty, standing open-mouthed watching this. One stout civil official acted as bookmaker, and bets on the issue were flying around.

I think the picture I have painted of Turkanaland is pretty black, but to kill any doubts let me mention a few of the vermin. Scorpions there are in thousands, some black, others brown, of huge size, and these secrete themselves under boxes and such like and woe betide the unfortunate individual who goes to lift the box. Nearly all the officers were bitten at one time or another.

The largest centipede I ever saw was here. Tarantulas abound among the palms and hold their nightly *ngomas*.

The one redeeming feature of Turkanaland is Lake Rudolph. It is not like other lakes in East Africa. Here are beautiful

sandy beaches, most perfect for bathing, despite the crocodiles. Bird-life teems; duck, pelicans, egret, and flamingo exist in countless numbers. I once saw 40 acres covered by pelicans as close as they could sit.

The reader will see from this introduction that the collection of birds comes from a district practically unexplored, and only just opened up by the military operations, and will realise the difficulties which had to be contended with in getting together such a remarkably interesting series.

NECTARINIIDÆ

1. *Nectarinia pulchella*. Linn. Green-bellied, long-tailed Sunbird.

♂ 9. Kobua River, W. Rudolph. March 1918.

♀ 12. Meuressi, Turkwell River. January 1918.

Juv. 4. Meuressi, Turkwell River. January 1918.

It is interesting to note that the birds collected in January are all in heavy moult and assuming the adult plumage, while those shot in March are in full breeding dress.

Exactly where *N. pulchella* meets *N. melanogaster* it is difficult to say at present, but *N. melanogaster* has been collected at Kacheliba.

2. *Hedydipna platura karamojæ*. van Someren, *B.B.O.C.*, February 1920. Yellow-breasted, long-tailed Sunbird.

♂ 3 } Mt. Kamalinga and Kimolo, N.E. Soroti,

♀ 1 } November 1917.

This is a well-marked race which is apparently limited to the West and South Rudolph area. The birds are in full, clean, breeding dress.

3. *Chalcomitra senegalensis æquatorialis*. Reich. Ruby-throated Sunbird.

♂ 3. Katachai and Dakabira, N.E. Lale, N.E. Soroti. November 1917.

♂ 3. Young. N.E. Soroti. November 1917.

♀ 2. Moroto. December 1917.

The occurrence of this and the next species in more or less the same locality is worthy of note.

4. *Chalcomitra hunteri*. Shelley. Hunter's ruby-throated Sunbird.

♂ 1. Adult. Meouessi. January 1918.

This bird does not differ from specimens of this species collected in the Tsavo area in any way, except that the extent of the red feathers of the breast with a blue bar is larger and these feathers are intermixed with those having the yellow bar.

5. *Chalcomitra kirki*. Shelley. Kirk's purple-throated Sunbird.

♂ 3. Adults. Moroto. November and December 1917.

Juv. 3. Moroto. December 1917.

Most are in moult from immature to adult plumage.

6. *Cinnyris cupreus*. Shaw. Copper Sunbird.

♂ 1. Soroti. November 1917.

An adult in full plumage.

7. *Cinnyris mariquensis suahelicus*. Reich. Eastern double-collared Sunbird.

♂ 1. Moroto. December 1917.

It is with some hesitation that I identify this bird as *C. m. suahelicus*, although it agrees perfectly with birds from Kisumu, and does not do so with the birds I have placed under *C. m. osiris*.

Their occurrence together is noteworthy. This species has a blue band separating the coppery green of the throat from the red breast-band, whereas the next species has a purple band. The throat in *C. osiris* is purer green, not coppery green, and the red band is darker, so also is the black of the abdomen.

8. *Cinnyris mariquensis osiris*. Finsch. Northern double-banded Sunbird.

♂ 5 } Moroto and Lale. November and December
♀ 1 } 1917.

Apparently a common species. The males are in full clean dress and are quite distinct from *C. m. suahelicus*.

9. *Cinnyris habessinicus turkanæ*. van Someren, B.B.O.C., February 1920. Yellow-tufted, red-breasted Sunbird.

♂ 15 }
♀ 3 } Kobua River, W. Rudolph. March 1918.

Most of the males are in full breeding dress.

10. *Cinnyrtus venustus blicki*. Mearns. Blick's yellow-bellied Sunbird.

♂ 1. Meuressi, Turkwell. January 1918.

Specimens from Kerio and Turkwell bear out Mearns' statement that this northern race is distinct from *C. v. falckensteini*, in being smaller and much more whitish on the belly.

11. *Anthreptes orientalis*. Hartl. Green-rumped, short-billed Sunbird.

♂ 5. Moroto, November 1917; Meuressi, January 1918.

♀ 2. Kobua River, W. Rudolph, March 1918; Meuressi, January 1918.

All the males have a wide green patch on the rump and wing joint.

12. *Anthreptes longmari* (?) Sub-sp. (?) Purple-rumped, short-billed Sunbird.

♀ 2. Dahabira, N.E. Soroti. November 1917.

Two females of the larger species, quite distinct from the males of the preceding species.

ZOSTEROPIDÆ

13. *Zosterops stuhlmani*. Reich. Stuhlman's Ring-eye.

♂ 2 }
♀ 1 } Moroto. December 1917.

Rather paler on the back than *Z. jacksoni* from North Elgon, and agreeing much better with *Z. stuhlmani*, though the under-surface is a clearer yellow.

PARIDÆ

14. *Parus albiventris*. Shelley. White-bellied Tit.

♂ 2. Moroto. 1917.

One bird is obviously young, and has the front of the head brownish.

15. *Parus leucomelas*. Rupp. Blue-black Tit.

♂ 1. Komolo, N.E. Soroti. November 1917.

16. *Anthoscopus musculus*. Sub-sp. (?) Buff-bellied Penduline Tit.

♂ 2. Meuressi. January 1918.

These birds appear to be intermediate between *A. punctifrons* from N.E. Africa and *A. rocatti* of Uganda. From *A. punctifrons* they differ in being much more isabelline on the under-surface, and lacking the black on the forehead feathers. These birds are matched fairly well by specimens from Magadi district and Tsavo, though these latter are not so greenish on the back.

MOTACILLIDÆ

17. *Motacilla raii*. Linn. European yellow Wagtail.

♂ 2. Kobua River, W. Rudolph.

Both in fresh summer dress, with heads yellow, washed with olive.

On comparing these birds with specimens collected round Nairobi, I was surprised to note the extraordinary variety of plumages in these birds, and, on consulting the latest works on British birds, can find not more than four birds in summer dress in my large series (forty skins) which agree either with the coloured plate or with the description of *M. raii*. It is possible that the birds with completely canary-yellow heads belong to a distinct race.

18. *Motacilla flava*. Linn. Blue-headed Wagtail.

♂ 6. Soroti and Kobua River. November 1917 and March 1918.

♀ 1. (Albinistic) Soroti. 1917.

In this species also one meets with great variation, especially in the intensity of the colour of the underside, so also in the colour of the head. In some cases the ear-coverts are grey, streaked with white, and a few have them black.

19. *Motacilla cinereicapilla*. Savin. Grey-headed Wagtail.

♂ 1. Kobua River, W. Rudolph. March 1918.

Very dark on the head, but possessing a few white feathers at the lores.

20. *Anthus trivialis*. Linn. European Tree-pipit.

♂ 3. Kobua River, W. Rudolph. March 1918.

In full breeding dress, with very ochraceous breasts.

21. *Anthus cervinus*. Pall. Red-throated Pipit.

♂ 4 }
♀ 2 } Kobua River, W. Rudolph. March 1918.

Two males are in practically full dress, while the other two are in heavy moult and show patches of red on the throat. The females are also in moult and retain most of their worn winter dress.

22. *Anthus nicholsoni longirostris*. Neum. Greater speckled-back Pipit.

♂ 1. Kobua River, W. Rudolph. March 1918.

This specimen has an exceptionally wide superciliary stripe.

23. *Macronyx croceus*. Vieill. Yellow-breasted Lark.

♂ 1. Soroti. November 1917.

Moulting; the old feathers giving it rather a greyer appearance on the back than usual.

ALAUDIDÆ

24. *Mirafra africana tropicalis*. Hartert. Northern red-winged Lark.

♂ 1. Moroto. November 1917.

In full clean plumage.

25. *Mirafra albicauda*. Sub-sp. (?) Intermediate.

♂ 1. Moroto. November 1917.

Very like birds from Magadi and Nakuru Lake, but darker than the Magadi specimens.

26. *Mirafra cantilans*. Sub-sp. (?)

♂ 1. Soroti. November 1917.

Much darker than *M. fischeri* from Kisumu.

27. *Galerita cristata erythrea*. Zedlitz. African crested Lark.

♂ 3 }
♀ 2 } Kobua River, W. Rudolph. March 1918.

All in worn dress. A pair collected on the 13th are larger and much greyer and have the spotting of the crop larger and more distinct, wings 104-6 mm.; whereas the two other birds are smaller and more ochraceous above and below, have wings of 94-7 mm. The flanks are not so distinctly streaked, and the outer tail-feathers are more pinkish buff. These may belong to another of the numerous sub-species of *G. cristata*.

These birds may be sexed wrongly, but having no

specimens with which to compare them I can come to no definite conclusion.

28. *Pyrrhuloxia signata*. Oust. Chocolate-faced Finch Lark.

♂ 5 }
♀ 2 } Kobua River, W. Rudolph. March 1918.
Juv. 1 }

One adult in full clean dress has wide edges to the coverts, giving the wings a striped appearance; most of the males are slightly worn, and one very much worn is decidedly darker brown on the back, not greyish, thus giving it an altogether darker plumage. Not having specimens from the type locality I am unable to decide whether *P. s. harrisoni* from Rudolph is separable from the Somali birds.

29. *Pyrrhuloxia leucotis smithii*. Bpt. (?) Sub-sp. Chestnut-backed Finch Lark.

♂ 1 }
♀ 1 } Kamalinga Mt., Karamoja.

Both birds in excellent plumage.

FRINGILLIDÆ

30. *Emberiza flaviventris*. Steph. Yellow-breasted Bunting.

1. Moroto. November 1917.

31. *Petronia massaica*. Neum. Yellow-throated Sparrow.

♂ 1. Moroto. January 1918.

♀ 3. Meouressi. January 1918 and November 1917.

These birds do not differ from those collected at Tsavo and the 'Dry Belt,' and I have adopted Neumann's name for specimens obtained.

32. *Passer abyssinicus*. Grey-headed Sparrow.

♂ 1. Meouressi, Turkwell River.

Quite distinct from *Passer diffusus ugandæ*, being much larger and heavier built in every way.

This bird is rather more red on the back than E. African specimens, and differs in the colour of the bill, which instead of being black is brownish horn above and ochre-yellow at the basal half of the lower mandible.

33. *Passer shelleyi*. Sharpe. Shelley's black-throated Sparrow.

♂ 1 }
♀ 1 } Mt. Kamalinga, Karamoja.

Agrees perfectly with description of type (the only specimen known) and plate of this specimen in having the black and white ear-coverts.

The occurrence of this bird in this district extends its known range considerably.

PLOCEIDÆ

Viduinæ

34. *Linura fischeri*. Reich. Fischer's straw-tailed Whydah.

♂ 1. Meouessi, Turkwell. January 1918.

A single specimen in heavy moult with the remains of the straw tail still retained.

35. *Steganura paradisea verreauxi* (?) Paradise Whydah.

♂ 1. Meouessi, Turkwell. January 1918.

An adult in full breeding dress was the only one noted in this district.

36. *Quelea sanguineirostris centralis*. van Someren. Pale-headed Dioch.

♂ 3 }
♀ 2 } Kobua River, W. Rudolph.

All in non-breeding plumage. One male is assuming the full dress and has the straw-coloured head, but lacks any trace of black on the cheeks and the ear-coverts. The bill is slightly heavier than birds from Nairobi district, but similarly plumaged birds to this male are to be found round Nairobi.

ESTRILDINÆ

37. *Amadina fasciata alexanderi*. Cut-throat Finch.

♂ 1 }
♀ 1 } Meouessi, Turkwell River.

Both in full plumage.

38. *Uroloncha caniceps*. Shelley. White-rumped Silver-bill.

♂ 2 }
♀ 3 } Meouessi, Turkwell. January 1918.

All in clean dress. Rather more rufous on the breast than southern specimens.

39. *Uroloncha cantans meridionalis*. Mearns. Black-rumped Silver-bill.

♂ 1 }
♀ 2 } Meuressi, Turkwell River. January 1918.

One female is in full clean dress and is more boldly marked than the other, the scaly feathers on the head are more pronounced.

40. *Uræginthus bengalus ugandæ*. Zedl. Uganda ruby-cheeked Cordon Blue.

♂ 3 } Moroto. November and December 1917.
♀ 1 } Meuressi. January 1918.

The female has the blue of the chin, throat, and breast continuous; the back a dark hair brown, as in Uganda birds, and differs from Tsavo birds which belong to a recognisable sub-species.

41. *Granitina ianthogaster ugandæ*. van Someren. *B.B.O.C.*, 1919.

♂ 1 }
♀ 1 } Meuressi, Turkwell. January 1918.

Quite distinct from *G. roosvelti*; more like birds from Simba, Tsavo, and Taveta.

42. *Estrilda rhodopyga*. Sund. Red-winged Wax-bill.

♂ 4 }
♀ 4 } Meuressi, Turkwell. January 1918.

When laid out in series along with specimens from Nairobi it is quite apparent that the Meuressi birds are certainly browner on the mantle; the throat and cheeks from Nairobi specimens are whiter.

43. *Estrilda charmosyna* (?) Reich. Somali masked Wax-bill.

♂ 1. Meuressi, Turkwell River.

This group requires further study, for there are apparently four distinct forms: *E. erythronota*, *E. delamerei*, *E. charmosyna*, and an intermediate form found from Simba to Tsavo, south to Taveta. (Since named *Kiwanukæ*, van Someren.)

The specimen obtained from Meuressi is exactly matched by specimens obtained at Kerio River, South Rudolph. Assuming that these (Turkana birds) are *E. charmosyna*, they are the palest of the group, having a pale brownish

back faintly washed pink and barred. The under-surface pinkish buff with a trace of black feathers restricted to the angle of the lower mandible, and no black on the undertail-coverts.

From Simba to Tsavo and Taveta is found a bird intermediate between *E. charmosyna* and *E. delamerei*, but nearer to the former.

This has the mantle decidedly greyish, faintly barred and tinged with pink; and the underside also greyish, washed pink, with a deeper shade of pink on the flanks; the amount of black on the chin larger than in *E. charmosyna* but not so large or so decided as in *E. delamerei*, which is very near to *E. erythronota*.

E. delamerei is altogether darker and has black on the lower breast, abdomen, and undertail-coverts. Thus the dark bird comes between the two pale birds in distribution.

44. *Lagonosticta rhodopareia*. Northern black-vented Fire Finch.

♂ 2 } Moroto. December 1917.
♀ 1 }

The black-vented Fire Finches of E. Africa and Uganda also require revision.

In comparing these birds with my series it is obvious that there are four forms:

(1) *L. congica*, from W. Uganda, having dark greyish hair brown on the mantle, and heads decidedly pinkish.
(2) *L. congica umbiventis*, sub-sp. (3 ♂ and 2 ♀ breeding) from Kenia and Embu district, much more brownish on the back and closer to *L. jamesoni*, and having the black of the belly broadly outlined with golden brownish, more brownish than the underside of the female of *L. congica*. (3) The Moroto birds (typical *rhodopareia*). These have little or no pinkish on the crown, but have red on the forehead and lores, much brighter than the red on the breast, and dark mantles like the Nairobi birds; and lastly *L. r. hildebrandti*, of Central East Africa to coast.

L. jamesoni is a species with one race.

45. *Pytilia soudanensis*. Sharpe. Northern Fire-throated Finch.

♂ 2 }
♀ 1 } Moroto. December 1917.

♂ 4 }
♀ 1 } Meuressi, Turkwell River.

The Moroto birds do not differ from those collected at Meuressi, all show bars on the undertail-coverts, some distinct and sharply defined, others pale and hardly visible. The Meuressi female has uniform pale buff undertail-coverts, that from Moroto faintly barred.

The colour of the red on the throat varies. Wings 60-62 mm. Birds from Tsavo and district are smaller, having wings of 55-56 mm., so also are birds from the coast, Mombasa, and Manda Island.

46. *Sporopipes frontalis*. Daud. Speckle-headed Weaver Finch.

♂ 2 } Moroto, November and December 1917;
♀ 1 } Meuressi, January 1918.

The female has much greyer cheeks than the males, and has the spotting on the forehead smaller.

47. *Dinemellia dinemelli*. Rüpp. White-headed Giant Weaver.

♂ 2 }
♀ 1 } Meuressi. January 1918.

Plumage rather soiled.

48. *Textor albirostris*. Vieill. White-billed Giant Weaver.

♂ 7 }
♀ 10 } Moroto. December 1917; January 1918.

All the male specimens, with the exception of two, are in off-plumage or young. Two females are adult and in breeding dress. The two males have the bills only just turning white, and the 'penis-like' growth in front of the anal opening just beginning to show.

Apparently these birds do not develop the swollen bill and 'penis' except in the breeding season.

49. *Plocepasser melanorhynchus*. Rüpp. White-rumped Weaver.

♂ 3 } Kobua River, W. Rudolph. March 1918.
♀ 2 } Meuressi and Turkwell. January and February 1918.

In full clean dress.

50. *Plocepasser superciliosus*. Cretzm. Red-crowned Weaver.

♂ 3 }
♀ 2 } Moroto. November and December 1918.

In good condition.

51. *Anaplectes melanotis*. Lafr. Red-fronted Weaver.

♂ 4 }
♀ 2 } Moroto. November and December 1917.

Two males in full plumage and two in the intermediate stage. One female has the primaries and secondaries edged with yellow, not red—possibly a young bird.

52. *Ploceus rubiginosus*. Rüpp. Black-headed chestnut Weaver.

♂ 1 }
♀ 2 } Meuressi, Turkwell River. January 1918.

The female is in off-plumage and shows no signs of moulting.

53. *Ploceus intermedius*. Medium black-headed Weaver.

♂ 4 }
♀ 5 } Meuressi, Turkwell. January 1918.

Two males almost in full plumage. The rest in off-plumage.

54. *Ploceus luteola*. Licht. Little thick-billed black-faced Weaver.

♂ 2 }
Juv. 1 } Kobua River, W. Rudolph.
Meuressi, Turkwell. January 1918.

Neither of the males are in breeding dress, and the female is obviously young.

ORIOLIDÆ

55. *Oriolus roletti*. Salvad. Rolett's black-headed Oriole.

♂ 2. Moroto, November 1917; Kobua River, W. Rudolph, February 1918.

♀ 1. Meuressi. January 1918.

The bird from Moroto is much more olive-green on the back than the other two.

56. *Oriolus auratus*. Vieill. African Golden Oriole.

♂ 1. Moroto. December 1917.

A fine bird in full plumage.

STURNIDÆ

57. *Pholidauges verreauxi*. Finsch. Purple-backed glossy Starling.

♂ 1 }
♀ 1 } Moroto. November 1917.

Adults in full plumage.

58. *Speculipastor bicolor*. White-winged pied Starling.

♂ 10 }
♀ 7 } Kozibiri River, December 1917; Kobua River,
March 1918; Meuressi, Turkwell, January
1918.

A fine series of adult birds in full breeding dress, seen in flocks. Fed chiefly on the ground.

59. *Amydrus morio rüppelli*. Verr. Rüppell's thick-billed red-winged Starling.

♂ 4 }
♀ 1 } Moroto. November and December 1917.

All adults, in good plumage.

60. *Lamprocornis purpuropterus*. Rüpp. Green-headed, long-tailed glossy Starling.

♂ 1. Meuressi, Turkwell. January 1918.

An adult in good plumage.

61. *Lamprocolius chalybeus*. Ehr. Blue-bellied glossy Starling.

♂ 1 }
♀ 1 } Moroto. December 1918.

Neither have terminal black spots on the secondary coverts. Wings, 140 mm.

62. *Spreo superbus*. Rüpp. White-banded glossy Starling.

♂ 2 }
♀ 3 } Meuressi, January 1918; Kobua River,
Rudolph, March 1918.

Some have no bluish neck-band at the back.

63. *Creatophorus carunculatus*. Gml. Wattled Starling.

♂ 3 }
♀ 2 } Moroto, November 1917; Meuressi, January
1918.

One male is in fully adult plumage, but possesses no wattles. The rest are immature.

DICRURIDÆ

64. *Dicrurus afer* (?) Drongo Shrike.

♂ 2. Moroto, November 1917; Meuressi, January
1918.

Both in bad plumage, though one is fully adult. Wings, 113 mm.

LANIIDÆ

65. *Prionops omoensis*. Neumn. Slaty-naped helmeted Shrike.

♂ 2 }
♀ 1 } Moroto. November and December 1917.

These birds agree with the description of *P. omoensis* exactly, and are similar to birds from Kerio River. They are in full plumage.

66. *Prionops*. Sub-sp. (?) Brown-naped helmeted Shrike.

♂ 1 }
♀ 4 } Meuressi, Turkwell. January 1918.

At first sight I was led to think that these fine birds must be simply the females of the preceding species, but on looking up the sexes I found males and females in both series.

These birds differ from *P. omoensis* in having the hind part of the crown, the occipital region, and sides of the neck brownish grey, with a darker line of brown down the posterior half of the ear-coverts, and having the throat slightly tinged with brown. In size they agree, having wings of 120–123 mm. Other differences are the absence of any well-marked white neck-band (this is washed brown) and the much larger white tips to the secondaries and primaries.

67. *Laniarius funebris*. Sooty Shrike.

♂ 4. Moroto, November 1917 ; Meuressi, Turkwell, January 1918.

♀ 1. Moroto. December 1917.

68. *Laniarius erythrogaster*. Cretz. Red-bellied Shrike.

♂ 3 }
♀ 1 } Soroti. December 1917.

All adults in good plumage.

69. *Dryoscopus malzacii nyanzæ*. Neum. Northern grey-shouldered Shrike.

♂ 2. Meuressi, Turkwell. January 1918.

♀ 3. Moroto, December 1917 ; and Komolo, November 1917.

70. *Tschagra senegala*. Linn. Greater red-winged Bush Shrike.

(Sex not stated) 1. Mt. Kamalinga, Karamoja.
November 1918.

Of the many sub-species described, this bird agrees most readily with *T. s. orientalis*, and not *armena*. The superciliary stripe is white in front and yellowish-brown posteriorly. The underside is decidedly grey, contrasting with the white throat and centre of the belly.

71. *Tschagra australis emini* (?) Reich. Lesser red-winged Bush Shrike.

(Sex ?) Adult. Moroto. December 1917.

I cannot refer this specimen with certainty to any of the described species. It agrees most readily with Neumann's *T. dohertyi*, which is supposed to be synonymous with *T. emini*, but it is altogether much darker and larger, having a strong wash of olivaceous on the chest and sides of breast, and very dark olivaceous on the flanks and undertail-coverts. The back, from the crown to the rump, is dark brown; while the superciliary stripe is strongly ochraceous. The chestnut of the wings is much darker. Wings 80 mm.

72. *Corvinella corvina affinis*. Heugl. Giant yellow-billed Shrike.

♂ 3. Moroto. November and December 1917.

Adults in clean full dress.

73. *Fiscus somalicus mauritii*. Neum. Grey-backed Shrike.

♂ 2. Meouressi, Turkwell. January 1918.

Both birds bear traces of the young plumage.

74. *Fiscus excubitorius princeps*. Cab. Great grey Shrike.

♂ 1. Katachai, N.E. Lale.

Wings, 111 mm.

75. *Lanius minor*. Gml. European lesser grey Shrike.

♂ 2. Meouressi, Turkwell, January 1918; Kobua River, W. Rudolph, March 1918.

♀ 1. Meouressi. January 1918.

In summer dress; but skins rather soiled owing to the amount of fat. The female specimen has traces of white on the forehead.

76. *Lanius collurio*. Linn. European red-backed Shrike.

♂ 1. Kobua River, W. Rudolph. March 1918.

A full-plumaged bird in clean condition.

77. *Lanius isabellinus*. Heugl. Eastern red-tailed Shrike.

♂ 1. Kobua River, W. Rudolph. March 1918.

In clean summer dress.

78. *Malaconotus approximans* (?) Chestnut-breasted thick-billed Shrike.

♂ 6 } Meuressi, Turkwell, January 1918 ; Moroto,
♀ 5 } December 1917.

All these are adult birds and in good plumage. The intensity of the breast-band varies considerably in various specimens, but in the majority it is well marked, more so than in specimens from Nairobi, yet not so marked as in skins from Lamu and Mombasa. These have the band of an entirely different shade of brown, and in my report on the Lamu birds I referred the coast specimens to *M. hypopyrrhus*.

M. catharoxanthus, a bird with uniform yellow under-surface, has been obtained from Elgon and district. Wings from 127–128 mm. The wings of the Moroto specimens and those from Meuressi vary from 110–120 mm.

79. *Chlorophoneus sulphureopectus similis*. Smith. Eastern yellow-bellied Shrike.

♂ 9 } Moroto, November and December 1917 ;
Juv. 2 } Meuressi, Turkwell, January 1918.

In this series some birds have uniform black ear-coverts, others black fading into grey. Those with black ear-coverts are the more richly coloured.

80. *Eurocephalus rüppelli*. Reich. White-headed Shrike.

♂ 2 } Meuressi, Turkwell, January 1918 ; Moroto,
♀ 3 } December 1917.

In full plumage, but rather soiled.

81. *Nilaus afer minor*. Sharpe. Brown-flanked Bush Shrike

♂ 1. Meuressi, Turkwell. January 1918.

A bird with pale yellowish-brown flanks.

82. *Nilaus afer erythrea* (?) Neumn. Chestnut-flanked Bush Shrike.

(Sex ?) Lale. November 1917.

Flank stripe, dark chestnut, not continuous but broken.

CAMPEPHAGIDÆ

83. *Campephaga phænicea*. Latham. Red-shouldered Cuckoo-Shrike.

♂ 1 }
♀ 2 } Lale, November 1917; Moroto, December 1918.

84. *Campephaga hartlaubi*. Salvad. Yellow-shouldered Cuckoo-Shrike.

♂ 1. Kobua River, W. Rudolph.

CRATEROPIDÆ

85. *Argya rubiginosa heuglini*. Sharpe. Northern brown babbling Thrush.

♂ 3 }
♀ 2 } Meuressi, January 1918; Moroto, December 1917.

One specimen with wings of 93 mm. from Meuressi. The remainder 85-87 mm.

86. *Crateropus cinereus buxtoni*. Sharpe. Buxton's babbling Thrush.

♂ 1. Lale, Soroti. November 1917.

♀ 1. Lale, Soroti, November 1917; and Meuressi, January 1918.

PYCNONOTIDÆ

87. *Pycnonotus barbatus minor*. Brown-headed, yellow-vented Bulbul.

♂ 1. Moroto. December 1917.

88. *Phyllastrephus pauper*. Sharpe. Brown-backed Bush Bulbul.

♂ 4. }
♀ 3. } Meuressi, January 1918; Moroto, December 1917.

SYLVIIDÆ

89. *Eremomelas elegans elgonensis*. van Someren. White-throated Golden Warbler.

♂ 3. Soroti and Komolo, N.E. Soroti.

In clean full dress.

90. *Eremomelas flavieristalis*. Sharpe. Lesser yellow-vented Scrub Warbler.

♂ 5. Moroto. December 1917.

♀ 1. Meuressi. January 1918.

These adult birds have the yellow limited to the vent region. They are distinctly paler and smaller than birds from Nairobi, Simba, Tsavo, and Voi districts.

91. *Prinia intermedia* (?) Jack. White-eyebrowed Scrub Warbler.

♂ 4. Meuressi. January 1918.

1 Juv. Moroto. December 1917.

A pale bird, much lighter in colour than *P. mystacea* from Uganda and East Africa.

One young bird from Moroto belongs to the common form found in Uganda.

92. *Camaroptera griseoviridis*. Mull. Green-winged Scrub Warbler.

♂ 3 } Moroto. December 1917.
♀ 1 }

Rather browner on the head than Uganda specimens, but similar to Nairobi and Nakuru birds.

93. *Sylvietta jacksoni*. Sharpe. Jackson's short-tailed Warbler.

♂ 2. Moroto, December 1917; Meuressi, January 1918.

Wings, 60 mm.

94. *Sylvietta brachyma leucopsis*. Reich. Northern pale-bellied short-tailed Warbler.

(Sex ?) 2. Adults.

Wings, 51-56 mm. Throat tinged isabelline, not pure white.

95. *Apalis rufifrons*. Sub-sp. Red-headed Scrub Warbler.

♂ 2. Meuressi, Turkwell River. January 1918.

Apparently a new form.

96. *Apalis pulchella*. Cretz. Little Buff-bellied Scrub Warbler.

♂ 3 } Moroto. December 1917.
♀ 1 }

97. *Eupirnoides karamojæ*. van Someren. White-winged Warbler.

♂ 1. Mt. Kamalinga.

I cannot place this bird amongst the known described species. It is nearest to *A. cinerea*, but differs in having the head and back uniform grey in colour, slightly browner on the wings, the inner secondaries with broad white edges. The centre tail-feathers jet black, the next pair white tipped, the remainder pure white; a white stripe from nostril to anterior angle of the eye; lores, blackish grey. Wings, 48 mm.

I have described this as new.

98. *Calamonastes simplex*. Cab.

♂ 1 }
♀ 3 } Meuressi, Turkwell. January 1918.

99. *Cisticola terrestris uropygialis*. Fraser. Little brown-rumped Grass Warbler.

♂ 2. Soroti, November 1917; Kobua River, W. Rudolph, March 1918.

Rather browner and more rufous on the rump than *C. t. ugandæ* and nearer to *C. uropygialis*.

100. *Cisticola rufa hypoxantha*. Reich. Little mottled-back Warbler.

(Sex ?) Adult. Moroto. November 1917.

Wings, 42 mm. In size similar to *C. rufa*, but with a mottled back, not uniform.

101. *Cisticola sp.* (?)

(Sex ?) 2. Mt. Kamalinga and Karamoja.

A species very much like *subruficapilla fischeri*, but smaller and having the inner webs of the wing-feathers white, not rusty, and lacking the yellow-brown edges on the outer webs.

102. *Acrocephalus palustris*. Bechst. Marsh Warbler.

♂ 1. Kobua River, W. Rudolph. March 1918.

In soiled and worn plumage.

103. *Hypolais pallida*. Hemp. Pallid Marsh Warbler.

♂ 1 }
♀ 1 } Meuressi, Turkwell, January 1918; Kobua
River, W. Rudolph, March 1918.

Neither in full summer dress.

104. *Phylloscopus trochilis*. Linn. European Willow Warbler.

♂ 2. Moroto, December 1917; and Kobua River, March 1918.

♀ 2. Moroto, December 1917; and Kobua River.
Wings 62-71 mm.

There is considerable variation in plumage. The bird with the longest wing having a dark crop-band, tinged brownish.

105. *Sylvia sylvia*. Linn. White-throat Warbler.

♂ 3. Kobua River. March 1918.

Two males are in full summer dress, the other is immature and much worn, and shows no signs of moulting.

106. *Sylvia nisoria*. Bechst. Barred Warbler.

♂ 10 } Meuressi, January 1918; Turkwell and Kobua
♀ 7 } River, W. Rudolph, March 1918.

This bird, although not supposed to migrate farther south than North-East Africa, has now been taken from the localities mentioned above, and from Simba, Tsavo, and Voi area.

In this series they are quite young birds, in first plumage, which shows no signs of barring, nor are they moulting.

TURDIDÆ

107. *Erythropygia leucoptera*. Rüpp. Red-backed Scrub Chat.

♂ 2. Meuressi, Turkwell. January 1918.

108. *Agrobates galactotes minor*. Cab. Grey-backed Scrub Warbler.

♂ 6 }
♀ 2 } Kobua River, W. Rudolph.

Wings 86-93 mm.

Some variation in colour and similar to birds from Tsavo and Taveta.

109. *Cichladus guttata*. Reich. Spotted - breasted Ground Thrush.

♂ 4. Moroto. November 1917.

♀ 3. Meuressi. January 1918.

Wings 85-92 mm.

Similar to birds from Kerio River in being much browner on the back, and considerably larger than birds from the coast to as far inland as Simba.

110. *Luscinia luscinia*. Linn. European Nightingale.
(Sex ?) Adult. Moroto. January 1917.
111. *Cossypha heuglini*. Hartl. Heuglin's Robin Chat.
 $\begin{matrix} \text{♂ } 1 \\ \text{♀ } 2 \end{matrix} \left. \vphantom{\begin{matrix} \text{♂ } 1 \\ \text{♀ } 2 \end{matrix}} \right\} \text{Moroto. November and December 1917.}$
 Wings 103 mm.
 Generally larger than birds from more southern localities and having a broader white superciliary stripe ; the brown of the tail lighter in colour. But these birds can be matched with specimens from Elgon.
112. *Monticola saxatilis*. Linn. European Rock-thrush.
 $\text{♂ } 3$. Lale, November 1917 ; Moroto, December 1917 ; Kobua River, March 1918.
 $\text{♀ } 1$. Meuressi, Turkwell. January 1918.
 In various stages of moult into summer plumage.
113. *Monticola rufocinerea*. Rüpp. Abyssinian Rock-thrush.
 $\begin{matrix} \text{♂ } 1 \\ \text{♀ } 1 \end{matrix} \left. \vphantom{\begin{matrix} \text{♂ } 1 \\ \text{♀ } 1 \end{matrix}} \right\} \text{Moroto. November 1917.}$
 In full plumage and good condition.
114. *Turdus pelios*. Sub-sp. (?) Northern brown-flanked Thrush.
 $\text{♂ } 1$. Komolo. November 1917.
 Much paler on the underside than birds from South Uganda, and lacking the olive tinge on the upper surface.
115. *Carcomela fuscicaudata turkana*. van Someren. *B.B.O.C.*, 1920. Grey Desert Chat.
 $\text{♂ } 1$. Kobua River, W. Rudolph. March 1918.
 $\text{♀ } 2$. Meuressi, Turkwell, and Kobua River. March 1918.
116. *Thamnolea subrufipennis*. Reich. Red-bellied Rock Chat.
 $\begin{matrix} \text{♂ } 1 \\ \text{♀ } 1 \end{matrix} \left. \vphantom{\begin{matrix} \text{♂ } 1 \\ \text{♀ } 1 \end{matrix}} \right\} \text{North-East Lale, Kioga.}$
 A pair in full plumage and good condition.

MUSCICAPIDÆ

117. *Bradornis griseus*. (?) White-throated grey Flycatcher.
 $\begin{matrix} \text{♂ } 2 \\ \text{♀ } 2 \end{matrix} \left. \vphantom{\begin{matrix} \text{♂ } 2 \\ \text{♀ } 2 \end{matrix}} \right\} \text{Meuressi, Turkwell. January 1918.}$

All uniform in colour.

- Wings 76–82 mm. Rather browner on the back than Tsavo and Kacheliba birds, which have wings of 70–75 mm.
 118. *Empidornis kavirondensis*. Neumn. Grey and brown Flycatcher.

♂ 5. Soroti, November 1917; Lali, November 1917.

♀ 2. Lali. November 1917.

These specimens do not differ from birds from Kavirondo and Suk.

119. *Batis puella*. Reich. Brown-throated puff-back Flycatcher.

♂ 1. Moroto. December 1917.

120. *Tchitrea suahelica*. Reich. Paradise Flycatcher.

♂ 6. Moroto, December 1917; and Meuressi, January 1918.

Four in the black and white, old stage; and two in the brown dress.

One old male has a large amount of brown streaks in the otherwise white tail-feathers.

HIRUNDIDÆ

121. *Hirundo rustica*. Linn. European Swallow.

♂ 1 }
 ♀ 1 } Meuressi, Turkwell. January 1918.

These are pale-breasted birds; neither is in full plumage.

CORACIIDÆ

122. *Coracias nœvius sharpei*. Reich. Bronze-wing Roller.

♂ 2. Moroto. December 1917.

♀ 1. Moroto. December 1917.

Wings 180–188 mm.

123. *Coracias abyssinicus*. Bod. Blue-breasted long-tailed Roller.

♂ 4. Kobua River, W. Rudolph.

All in full plumage and excellent condition.

124. *Coracias caudatus*. Linn. Lilac-breasted, long-tailed Roller.

♂ 1. Moroto. December 1917.

♀ 1. Kobua River, W. Rudolph. February 1918.

MEROPIDÆ

- 125.
- Merops nubicus*
- . Gml. Crimson Bee-eater.

♂ 5 }
 ♀ 3 } Kobua River. March 1918.

All in full plumage.

- 126.
- Merops persicus*
- . Pall. Yellow-throated green Bee-eater.

♂ 2. Kobua River, W. Rudolph, 1918.

In breeding dress.

- 127.
- Merops albicollis*
- . Vieill. White-throated Bee-eater.

♂ 7. Kobua River, W. Rudolph. March 1918.

Full-plumaged birds in good condition.

UPUPIDÆ

- 128.
- Upupa epops*
- . Linn. European Hoopoe.

♂ 1. Kobua River, W. Rudolph. March 1918.

An undoubted specimen of the European bird with a white bar on the crest separating the rufous of the crest from the black tips.

- 129.
- Irrisor niloticus*
- . Neum. Blue - throated, red - billed Hoopoe.

♂ 4.
 Juv. 1 } Kobua River, W. Rudolph. March 1918.

According to C. Grant the birds north of the Turkwell are *I. niloticus*. These were obtained on the Kobua River where it flows into Rudolph. These birds can be exactly matched with one from Kerio River, much farther south.

The size of the spots on the tail varies. A young bird with black bill has quite small tail spots.

- 130.
- Rhinopomastus cabanisi*
- . de Filippi. Orange - billed Hoopoe.

♂ 1
 ♀ 2 } Meuressi, Turkwell. January 1918.

The male is in newly moulted dress and is bluer than birds from Tsavo district, which are shot with purple on the mantle.

BUCEROTIDÆ

- 131.
- Lophoceros jacksoni*
- . Og.-Grant. Jackson's red-billed Hornbill.

♂ 1. Moroto. December 1917.

An adult in fine clean condition.

132. *Lophoceros nasutus*. Linn. Grey-headed Hornbill.

♂ 1 }
♀ 1 } Moroto. December 1917.

The male is a large bird with wings 238 mm. The female 198 mm.

ALCEDINIDÆ

133. *Ceryle rudis*. Linn. Pied Kingfisher.

♂ 2 }
♀ 2 } Meuressi, Turkwell River.

One adult, and three young showing traces of immature plumage.

COLIIDÆ

134. *Colius macrourus pulcher*. Neum. Blue-naped Coly.

♂ 4 } Moroto, December 1917; Meuressi, January
♀ 3 } 1918.

All darker than coast birds.

MUSOPHAGIDÆ

135. *Turacus leucolophus*. Heugl. White-headed Plantain-eater.

♂ 6 }
♀ 3 } Moroto. December 1917 and April 1918.

All adults in full plumage.

CUCULIDÆ

136. *Cuculus solitarius*. Steph. Brown-breasted Cuckoo.

♂ 3. Kobua River.

One specimen has uniform undertail-coverts, the other two barred. The amount of barring on the breast varies considerably.

137. *Coccystes cafer*. Licht. Black-throated Crested Cuckoo.
Moroto. 1917.

A young bird in moult.

138. *Coccystes glandarius*. Linn. Great Spotted Cuckoo.

(Sex ?) Moroto. November 1917.

139. *Chrysococcyx klassi*. Steph. White-breasted Emerald Cuckoo.

♂ 1. Kobua River, W. Rudolph.

INDICATORIDÆ

140. *Indicator variegatus*. Less. Speckle-fronted Honey Guide.

♂ 2. Moroto. November 1917.

One in clean full dress, the other rather soiled and worn.

141. *Indicator indicator*. Gml. Black-throated Honey Guide.

♀ 1. Meuressi. January 1918.

142. *Indicator minor teitensis*. Neum. Medium Green-backed Honey Guide.

♂ 5 } Moroto, December 1917; and Kobua River,
♀ 1 } W. Rudolph.

Wings 80-93 mm.

I am not satisfied with the identification of these birds, although it is in keeping with C. Grant's conclusions.—*Vide* 'Ibis,' July 1915.

These birds are much darker than Nairobi specimens, especially on the crop and the abdomen.

In this series there are two young birds which account for the small wing measurements in two cases—80-82 mm.

143. *Indicator exilis pygmeus* (?) Reich. Small Grey-breasted Honey Guide.

♂ 2. Moroto. November 30, 1917.

These birds are adult and have wings measuring 68 mm. and 69 mm. They are much greyer on the underside than *I. exilis*, thus agreeing better with *I. exilis ansorgei*.

CAPITONIDÆ

144. *Lybius ugandæ*. Berger. Uganda Red-headed Barbet.

♂ 2. Komolo and Dakabira, Soroti.

Both in good plumage.

145. *Tricholcema diademata* (?) Red-fronted Barbet.

♂ 2 } Moroto. December 1917.
♀ 2 }

The females are heavily washed with yellow on the underside, one specimen showing a considerable amount of speckling on the abdomen and flanks.

146. *Tricholcema lachrymosa*. Cab. Black-faced Barbet.

♂ 4 } Moroto. December 1917.
♀ 2 }

In clean fresh dress. The pale tips to the lesser wing-coverts being very noticeable.

147. *Barbatula pusillus*. Reich. Little Red-crowned Barbet.

♂ 2. Moroto. December 1917.

In full plumage. Wings 54-55 mm.

148. *Trachyphoneus d'arnaudi*. Desmurs. Waxy-headed Barbet.

♂ 2 }
♀ 2 } Moroto. December 1917.

One specimen very worn.

149. *Trachyphoneus erythrocephalus*. Red-headed Barbet.

♂ 9. Moroto. December 1917.

♀ 8. Meouressi, Turkwell River. January 1918.

Out of this large series only five have red undertail-coverts.

PICIDÆ

150. *Campothera nubica nubica*. Gmel. Nubian red-headed Woodpecker.

♂ 3. Moroto and Meouressi. January 1918.

Juv. 1. December 1917.

♀ 5. Moroto. December 1917.

In this series great variation exists both as regards the upper- and the under-surfaces. Some males are barred, others spotted on the mantle.

151. *Dendropicus fuscescens massaicus*. Neum. Massai brown-fronted Woodpecker.

♂ 1 }
♀ 1 } Moroto. November and December 1917.

Both adults in good condition.

152. *Thripias namaquus schoensis*. Rüpp. Bearded Woodpecker.

Juv. (?) Meouressi, Turkwell. January 1918.

This is a male bird, but is coloured like a female, except that there are one or two red feathers appearing on the hind part of the crown.

153. *Mesopicus goertae centralis*. Reich. Northern grey-bearded Woodpecker.

♂ 1 }
♀ 1 } Moroto. January 1918.

COLUMBIDÆ

154. *Columba guinea longipennis*. Reich. Eastern Hackled-neck Pigeon.

♂ 2. Kobua River.

Both are young birds in heavy moult.

PSITTACIDÆ

155. *Poicephalus meyeri saturatus*. Sharpe. Yellow-shouldered Parrot.

♂ 1. Moroto. December 1917.

♀ 2. Meuressi. January 1918.

In naming these specimens I laid out the whole of my series of these parrots from Uganda—from localities varying from Western Uganda to Elgon and Rudolph.

From the series before me (thirteen specimens) I cannot agree with C. Grant ('Ibis,' April 1915), that *P. meyeri saturatus* (presuming that all these specimens belong to one race) have, on the average, green under-surfaces and rumps. Out of thirteen, seven have decided bluish rumps and under-surfaces tinged bluish. They are certainly not so blue as specimens of *P. meyeri matschiei* from German East Africa. The Moroto birds can be matched with birds from Elgon and North Kavirondo.

One specimen, adult, is much worn and is moulting. The new feathers of the mantle are decidedly green, with brighter green margins. The other two are dark earthy brown, washed with green.

It is quite possible, and worn specimens appear to corroborate this, that the blueness of the rumps and under-side of Uganda birds depends upon the amount of wear and exposure of these parts.

STRIGIDÆ

156. *Glaucidium perlatum*. Vieill. Little spotted Owlet.

♂ 1 }
♀ 3 } Meuressi. January 1918.

No two are alike with regard to the shape, size, and quantity of the spots on the upper side.

157. *Scoptelia leucotis*. White-faced Owl.

(Sex ?) 1. Adult. Rock Abela.

♂ 2. Meuressi, Turkwell, and Kobua River, W. Rudolph.

♀ 2. Kobua River.

Only one adult in good plumage; the remainder of the series are young birds, still retaining a large amount of downy feathers on the flanks and thighs. They lack any black on the crown, while the black shaft streaks of the feathers of the body are narrower and the plumage generally more tinged with brown, particularly on the under-surface.

FALCONIDÆ

158. *Falco minor*. Bp. Lesser Peregrine Falcon.

♂ 1. Meuressi, Turkwell. January 1918.

A single specimen in full plumage and good condition.

159. *Falco ruficollis*. Swains. Red-necked Falcon.

♂ 2. Meuressi, Turkwell, January 1918; Kobua River, March 1918.

The first specimen is fully adult and in good plumage.

The second is still in half immature plumage.

160. *Cerchneis naumanni*. Fleisch. Lesser Kestrel.

♀ 1. Meuressi, Turkwell. January 1918.

One adult female in moult.

161. *Cerchneis arthuri*. Pale Kestrel.

♂ 1. Meuressi, Turkwell. January 1918.

161A. *Melierax gaber*. Daud. Daudin's Goshawk.

♂ 1. Meuressi, Turkwell. January 1918.

Probably a female, judging by its size, though sexed as male. It is in the second plumage.

162. *Astur sphenurus*. Rüpp. Rüppell's Goshawk.

(Sex ?) Meuressi. Turkwell. January 1918.

A young bird assuming the adult plumage.

163. *Pholohierax semitorquatus*. Pigmy Falconet.

♂ 2. Meuressi, Turkwell. January 1918.

♀ 6. Kozibiri River, December 1917; Moroto, December 1917; Meuressi, January 1918.

The females are young birds in moult to adult plumage.

The chestnut of the back is lighter than in the adults. The secondaries and coverts are tipped with brown.

ARDEIDÆ

164. *Butorides atricapilla*. Afzel. Little Green-backed Heron.
 Juv. 2. Kobua River. March 1918.
 Both young birds.

PELICANIDÆ

165. *Phalacrocorax africanus*. Gmel. Little Cormorant.
 Juv. 1. Meuessi, Turkwell. January 1918.

LARIDÆ

166. *Hydrochelidon leucoptera*. Meisner. White-winged Black Tern.

♂ 6 }
 ♀ 2 } Kobua River, W. Rudolph. March 1918.

None in full plumage. These are probably young birds, some of which would no doubt remain throughout the summer.

PHASIANIDÆ

167. *Francolinus granti* (?) Grant's Bush Francolin.
 ♂ 1. Meuessi, Turkwell.
 168. *Ptilopachus florentiae*. Og.-Grant. Lady Delamere's Rock Francolin.
 ♀ 1. Moroto. December 1917.
 The only one obtained, though several were heard.

PTEROCLIDÆ

169. *Pterochlorus exustus ellioti* (?) Bodg. Elliot's Pin-tail Sand Grouse.

♂ 2 }
 ♀ 2 } Meuessi, Turkwell. January 1918.

One male has the belly brown, like the flanks, and is paler on the back than the other, which has the belly black.

170. *Sarciophorus tectus*. Bodd. Bearded Wattled Plover.
 ♂ 2. Meuessi, Turkwell. January 1918.
 ♀ 1. Moroto. December 1917.

Rather soiled below, but otherwise in full dress.

CHARADRIIDÆ

171. *Hoplopterus spinosus*. Linn. Pied Lapwing.
 ♂ 2. Kobua River, March 1918 ; Meuressi, January 1918.
 ♀ 2. Meuressi, Turkwell. January 1918.
 Adults in full plumage.
172. *Charadrius asiaticus*. Pall. Asiatic Dotterel.
 ♂ 3 }
 ♀ 1 } Kobua River.
173. *Charadrius dubius coronicus*. Lesser Ringed Plover.
 ♂ 2 }
 ♀ 3 } Kobua River. March 1918.
 Two males in full breeding dress ; one female is obviously a young of the last season.
174. *Totanus stagnatalis*. Bechst. Marsh Sandpiper.
 ♂ 2. Kobua River. March 1918.
 Not yet in full summer dress.
175. *Totanus glareola*. Linn. Wood Sandpiper.
 ♂ 2. Kobua River, March 1918 ; Meuressi, Turkwell, January 1918.
 Still in moult.
176. *Totanus ochropus*. Linn. Green Sandpiper.
 ♂ 2. Kobua River. March 1918.
177. *Totanus hypoleucos*. Linn. Common Sandpiper.
 ♂ 3. Meuressi, Turkwell, January 1918 ; and Kobua River.
 ♀ 1. Meuressi, Turkwell. January 1918.
178. *Totanus glottis*. Linn. Green Shank.
 ♂ 1. Kobua River, W. Rudolph. March 1918.
 In almost full summer dress.
179. *Tringa subarquata*. Guld. Curlew Sandpiper.
 ♂ 3. Kobua River, W. Rudolph. March 1917.
 None showing much signs of moulting into summer dress.
180. *Tringa minuta*. Leisl. Little Stint.
 ♂ 2. Kobua River, W. Rudolph. March 1918.
 Not as far advanced in the spring moult as one would expect from the date.
181. *Parvonnella pugnax*. Linn. Ruff.
 ♂ 1. Kobua River. March 1918.
 In more winter than summer dress.

182. *Rhynchea capensis*. Linn. Cape Painted Snipe.
 ♂ 2. Meuressi. January 1918.
183. *Edicnemus edicnemus*. Linn. European Stone Curlew.
 ♂ 2. Meuressi. January 1918.
 Two adults of the European bird in full clean dress.
184. *Rhinoptilus cinctus*. Heugl. Three-collared Courser.
 ♂ 2. Kobua River, W. Rudolph. March 1918.
 Two specimens in perfect plumage.
185. *Cursorius somaliensis*. Blue-naped Courser.
 ♂ 2. Kobua River, W. Rudolph.
 In excellent plumage.
186. *Glareola fulleborni*. African Pratincole.
 ♂ 2 }
 ♀ 2 } Kobua River, W. Rudolph. March 1918.
 These are resident, and breed in Africa.

NOTES ON EAST AFRICAN MAMMALIA (OTHER THAN
 HORNED UNGULATES) COLLECTED OR KEPT IN
 CAPTIVITY 1915-1919. PART I.

BY ARTHUR LOVERIDGE

The following notes are chiefly based on a collection of 500 small mammals made for the British Museum during the campaign in German and Portuguese East Africa.

The principal localities referred to in the late German East Territory are Dar-es-Salaam, Morogoro, Dodoma, and Tabora, all situated on the Central Railway. Moshi, Arusha, and Longido West are in the more northern part of the country, therefore nearer the Anglo-German boundary.

The only locality in Portuguese East mentioned is Lumbo, the site of a British camp on the mainland some three miles from Mozambique Island.

Where measurements are given, the length from nose to tip of tail is usually in inches, followed by millimètre measurements of head and body, tail, hind foot, and ear. In the case of bats the length of wing and across both wings is added.

In every instance the measurements are given in the above order.

The determination of the species was carried out by Mr. Oldfield Thomas or his staff, to whom I am indebted for supplying me with the names. Mr. Hinton in particular has shown great kindness in reading and correcting proofs.

CERCOPITHECIDÆ

Cercopithecus albogularis rufilatus, Poc.—This blue-grey Sykes Monkey was not uncommon at Morogoro though never seen in large companies ; individuals were sometimes seen quite alone. On one such occasion when standing on the bank of a deep donga, the writer was surprised to see one of these monkeys coiled up in the top of a euphorbia tree, which, as it was growing from the donga, was about level with him. This was the more strange seeing that the boys had been standing within thirty feet of it throwing stones into an adjoining bush to drive out a squirrel. The minute it realised it was seen it sprang away.

For many months I had a very handsome pair of these monkeys in captivity, they were very docile and affectionate. It was customary to release the female early on Sunday mornings and fasten her up again about noon. As soon as released she would go swinging away up the avenue in the tops of the acacia trees and make quite long excursions. In one instance she appeared in the doorway of the officers' mess whilst everyone was at breakfast ; the mess dog came forward growling, but the monkey went for it so menacingly that the dog slunk under the table, much to everyone's amusement.

During the week the monkey was chained to a ring which slid up and down a pole about ten feet in length, its box, with a curtain of sacking across the front, was fixed to the top of the pole. From its box it could spring into an acacia tree where at first it used to get entangled and need assistance ; after a time it would take hold of its chain at the waistbelt and, following it back, climb over and under branches until it was freed once more.

Like all monkeys it had a great dislike for the native and

would return their grimaces with interest, its attitude towards my personal boy varied considerably however. Whilst I was absent from the camp one day a swarm of bees invaded its box and at considerable personal risk Salimu uncoupled its chain and brought the scared animal away. Hearing of the bees I was hurrying to my quarters when I met the pair of them, the monkey clinging round Salimu's neck with great show of affection and chattering if one attempted to take it away. 'To-day monkey and I are great friends,' was the boy's remark in Ki-Swahili. In this connection I might add that only a few weeks before a monkey of the same species, which lived some two hundred yards away, was stung to death, though an officer and a sergeant made several futile attempts at rescue. On skinning this monkey, one found considerable hæmorrhage beneath the skin and there seemed to be scarcely a square inch of flesh which had not received a sting.

It greatly objected to the boy sweeping near its pole and would make demonstrations of wrath, seizing the broom-handle and menacing him. One day when he was carrying a plate of biscuits into the *banda*, it bit his ankle suddenly, causing him to spill some biscuits on the ground, which it promptly seized and carried to the top of its box. If a party sat down to afternoon tea and took no notice of her, she behaved in the strangest way, biting furiously at one foot, burying her head in her fur as if in great pain, alternating these actions by spinning round in a mad frenzy. On several occasions friends have said: 'Hallo, your monkey has been stung or something.' The object of this behaviour was only to attract attention, and as soon as a cake was thrown her she would become normal immediately.

On moonlight nights she was very wakeful and if anyone walked past her box she would draw aside the sacking curtain and look down in a most human way. Her mate met with a sad end, for one morning someone fastened it to a marquee on the sunny side; this must have been about noon, for at 1 p.m. the creature was brought to me dead. People do not appreciate the fact that monkeys spend the hot hours of the day in leafy and shady retreats, and that they are very liable to sunstroke.

Like people their temperaments vary greatly; I once took

charge of a young one of this species for a month to see what could be done with it. Its behaviour was like that of a naughty child, petulant and irritable, it would fly into its box and chatter wildly if anything annoyed it; and if its food was not to its liking it would throw it on the ground.

Cercopithecus pygerythrus johnstoni, Poc.—The coat of this species is of an olive-buff hue, the face is black. Young ones are very pale grey and totally unlike the adult; such nurslings have very silky fur and in general appearance are somewhat spidery owing to this disproportionate development of their limbs. The stomachs examined contained green leaves only. Large companies of these monkeys were to be met with in the forest-clad lower slopes of the Uluguru Mountains at Morogoro. Parties of them would descend on the cultivated plots in the early morning, placing one of their number in a tree to act as scout and warn them of the approach of any potential enemy.

I first made the acquaintance of this species when camping in part of a German factory near the station. Whilst lying on my bed beneath a mosquito net I heard a 'thud' and beheld upon my cupboard a big monkey, who had just taken a five-foot drop from the loft above, and on landing grunted 'Umph.' Another 'thud.' This time he landed on the table, picked up a piece of bread, which he smelt and wrinkled his nose at. Next minute it was gone; he then sniffed at a recently used soup-plate, licked it—no good. Took a third of a loaf and was enjoying himself hugely within a yard of me, all unconscious of my presence. Then I moved slightly and 'bang' 'bang.' Exit monkey! and my ration.

For three weeks it became the plague of my life. I tried first of all to drive it away—a very futile proceeding. Then I concealed cyanide in bread which was left on the cupboard or table, it would eat the bread and leave the cyanide. I powdered the cyanide and mixed it with treacle which I spread lavishly, thus losing much good treacle, for the monkey would carry it up to the loft, sniff at it, and then throw it down again. He knew all about condensed milk, would steal a tin and, ascending to the roof, hammer the tin on the galvanised iron in a vain attempt to get at the contents. He became so bold that he would come through the window and snatch bread off

the plate whilst I was sitting at table reading. This proved his undoing, for I cultivated his entering through the window and finally set a noose, which I pulled at the critical moment. He sprang from the window, but, finding the noose round his neck, clambered up the rope, hand over hand, and in at the window, where he sat and gibbered at me. I led him captive across the room and gave him away to someone who wanted a pet.

Then there was Jenny, the Simian Houdini of Morogoro; her name and ways were known to all the monkey proprietors of the district; many times she had been in bonds, but always to escape. Like other monkeys that have been in captivity, however, she made no attempt to rejoin the roving bands of wild monkeys that often came within sight of her haunts. Jenny was a familiar object at the Stationary Hospital, where she could be seen sliding down tent-ropes, sitting on the ridge-poles of marquees, racing through the wards, perched upon the foot of a patient's bed grimacing at him and refusing to be cajoled with a tit-bit to come within an arm's length, or lastly paying calls on the captive monkeys whom she alternately fondled and robbed.

She began coming regularly to make love to my monkey along these lines, but always took to the trees on my approach. After some time I induced her to sit on the fence and furtively nibble Paupau fruit which I held out to her at arm's length; if I attempted to shorten the arm Jenny would be ten feet away immediately. I therefore arranged with a boy to go to the farther side of the fence and, whilst I engaged her attention, to seize her tail which hung down on the far side of the fence. The plan worked and Jenny was made captive; she did not attempt to bite, to my surprise, but gave a most remarkable 'frightfulness' demonstration. Opening her mouth till her lips formed a great 'O,' she raised her bushy white eyebrows. The effect is no doubt somewhat startling, especially when accompanied by a short rush; generally, however, it had the effect of making people laugh, as it was so like a ridiculous caricature of human astonishment.

(To be continued.)

NOTES ON THE GEOGRAPHICAL VARIATION OF
SOME BRITISH EAST AFRICAN BUTTERFLIES

PART I.

BY REV. K. ST. AUBYN ROGERS, F.E.S.

The Ethiopian region, which includes all Africa south of the Sahara, and the southern part of Arabia, is quite well marked. The fauna is related to that of the neighbouring part of the Oriental region, but is abundantly distinct.

The insects as a whole exhibit also some relationship with that of other regions, as is generally the case.

As regards butterflies there are numbers of genera and some larger groups confined to the region, though there are many genera, and indeed some species, which are also found in India and other parts of the Orient, and there are a few genera and species which are related to the fauna of other regions.

The larger groups referred to are the Lycænids of the sub-family *Lipteninae* and the Nymphalines of the group which Aurivillius has called *Nymphalidi*, including *Euphaedra*, *Euryphene*, *Harma*, and their allies.

It is true that the Oriental *Liphyra brassolis* has been generally referred to the *Lipteninae*, but recent investigations indicate that this reference is erroneous, though some West African species, which have also been wrongly placed in the *Lipteninae*, are nearly related to it.

Both these groups are very large, containing something like 200 species each, divided into a large number of genera, and are for the most part confined to the forest region of West Africa, and being but scantily represented in the east and south, whilst the *Lipteninae* have no representative in Madagascar, and the *Nymphalidi* but one.

Besides these two large groups many genera are peculiar to the region, e.g. *Amauris* (*Danainae*), *Gnophodes*, *Leptoneura*, *Physcænura*, *Neocænura*, &c. (*Satyrinae*), *Planema* (*Acræinae*), *Pardopsis* (usually placed in the *Acræinae*, though Dr. Eltringham, who has carefully examined the structure, says it has

nothing to do with this sub-family), *Lachnoptera*, *Salamis*, *Crenis*, *Euxanthe*, &c. (*Nymphalinae*), *Lachnocnema*, *Myrina*, *Iolaus*, *Capys*, *Zeritis*, *Axiocerces*, &c. (*Lycaenidae*), *Mylothris*, *Herpænia*, *Calopieris*, *Argeronia* and the aberrant *Pseudopontia* (*Pierinae*), *Abantis*, *Cænides*, *Rhopalocampta*, &c. (*Hesperidae*).

Moreover, *Acræa* and *Teracolus* are mainly African, though they have spread into the adjoining parts of India.

Besides its primary relationship to the contiguous Oriental region, there can be no doubt that some genera of butterflies are not distantly related to the fauna of South America. The genus *Crenis*, which has no allies farther east, belongs to a Neotropical group of *Nymphalines*, and the nearest allies of *Acræa* are the butterflies of the South American genus *Actinote*, whilst the butterflies now referred to the genus *Antanartia* were until recently in the South American genus *Hypanartia*, to which they are very closely allied.

Moreover, a few species of Palæarctic genera have succeeded in spreading into Africa, i.e. *Argynnis* (four species), one only being found in British East Africa; *Heodes* (*Chrysophanus*), represented in British East Africa by *H. abbotti*; *Synchlœ*, represented in British East Africa by *S. johnstoni*, and *Colias electra*, hardly separable from the European *C. edusa*. All these are confined to areas of considerable elevation, and it is a curious fact that *Colias*, *Argynnis*, and *Heodes* have spread into India and along the Andes to South America, whilst the last-named is even found in New Zealand.

GEOGRAPHICAL SUB-REGIONS

I do not propose to discuss the vexed question of the relationship of the fauna of Madagascar to that of the mainland of Africa. So far as butterflies are concerned the relationship is very close, most of the Madagascar species belonging to Ethiopian genera, and some even being conspecific with those from the mainland. It is true that there are a few species showing decided Oriental affinities, but it is probable that these are due to transoceanic immigration, and this seems to be still proceeding, the widespread Oriental *Hypolimnas bolina* having reached the island during the last few years, and having already become abundant in some localities.

In his great work on the 'Geographical Distribution of Animals,' Dr. A. R. Wallace divided the mainland of the Ethiopian Region into three sub-regions. The first of these comprised the greater part of Africa, extending from the northern part of the west coast right across the continent to Abyssinia, and thence south to the tropic of Capricorn, and again reaching the west coast in Angola. The second sub-region comprised the tropical forests of West Africa, but reached as far east as the Nile basin. The third was confined to extra-tropical South Africa.

Of these sub-regions the second, as far as butterflies are concerned, is by far the most typical and peculiar. A great many of the most characteristic genera and species are either entirely confined to this sub-region or chiefly represented in it, more especially the Nymphalines of the group *Nymphalidi* and the Lycænids of the sub-family *Lipteninae*, as already mentioned.

The third sub-region is more closely connected with the first, some of the most characteristic South African genera crossing the tropic, whilst a large number of the South African species are found as far north as the Equator.

In his splendid work on 'South African butterflies,' Trimen recorded 21 Satyrines, 6 Acræines, 20 Nymphalines, 75 Lycænids, 28 Pierines, 7 Papilionines, and 35 Hesperids, as peculiar to South Africa; but at that time (1888) the butterflies of eastern tropical Africa were little known, and a large proportion of these have been since found to inhabit the southern part of the eastern tropics, and even British East Africa. Moreover, Trimen recorded six genera, *Meneris*, *Cænys*, *Capys*, *Arrugia*, *Durania*, and *Deloneura*, none having more than three species, as endemic in South Africa, but of these *Capys* is now known to extend as far as the Dar-es-Salaam-Ujiji railway, whilst *Deloneura* crosses the Equator in the Kavirondo province of British East Africa. As would naturally be expected, the first region, with its immense extent, is very much richer than South Africa, and the more tropical parts of it, where well watered, are very much richer than any part of South Africa except, perhaps, the coast of Natal and the country to the north of it. I should say that Trimen

overestimated the number of species found in South Africa, especially in the *Pierinae* and the genus *Precis*, owing to the fact that in his day the extraordinary seasonal variation was but little appreciated, but, on the other hand, further exploration of the country has resulted in the discovery of several additional species, so that the total number recorded is probably not far from correct.

In British East Africa the number of species to be found in the coast district is somewhere in the neighbourhood of 250, and the Taita district has produced about the same number, the genera *Acraea* and *Teracolus* being particularly well represented in this latter. The environs of Nairobi probably produce about 200 species, but the low-lying country near Victoria Nyanza is much richer, owing to the spread of many western forms through the forests of Uganda.

DANAINÆ

Danaïda chrysippus.—All forms of this species occur, but the *Dorippus* form, which lacks the black and white tip in the fore-wing, is predominant, and I should estimate that to the east of the Rift Valley 80 per cent. are of this form, and even in the lake region the large collection made by Dr. C. A. Wiggins contained about 50 per cent. of this form and *Albinus*, which only differs from it in having the greater part of the hind wing white. In the Oriental region the type-form is found almost exclusively, and the same is true of South Africa, whilst in West Africa the only form found in many parts is the *Alcippus* form, which differs from the type-form as *Albinus* differs from *Dorippus*. As the *Dorippus* form is predominant from Mombasa to the Rift Valley, without regard to the differences in climate and rainfall, the suggestion that this form is due to drought seems untenable. The *Dorippus* form is probably common throughout the recently conquered territory to the south, and in the Mpapua district I should estimate that between 60 per cent. and 70 per cent. were of this form, but farther south it seems to become much rarer.

Danaïda formosa.—This species is not rare in most parts of East Africa, and I found it plentiful in the Mpapua district. In Uganda it is replaced by *D. mercedonia*, which differs from

it in the considerable reduction of the bluish-white spots in both wings. It is true that the red-brown areas are more extensive in *D. mercedonia*, but they are so much darker, almost maroon instead of bright fulvous, that they do not detract from the prevalent darker colouring of the species. In West Africa there is another species, *D. morgenii*, which is darker still. As Aurivillius has pointed out, this difference is characteristic of the East African butterflies in many families, and it seems highly probable that it is due to climatic causes, and is produced by the comparative dryness and possibly excess of sunshine in the East, but it is quite likely that the fact that West Africa is pre-eminently a forest region compared to East Africa is at least a contributory cause.

Amauris niavius.—The eastern form is known as *Dominicanus*, and is rightly regarded as a subspecies; the lake region, where the two forms meet, producing numerous intergrades, as has been pointed out by Mr. S. A. Neave. *Dominicanus* is found throughout tropical East Africa and extends to Natal, though it is usually uncommon there. It differs from the type-form in the great increase of the white areas in both wings, and is also appreciably larger. This is a characteristic example of the change that takes place in the pattern of butterflies in passing from west to east in Africa, and the increase in size is also frequently met with.

A. echeria and *A. albimaculata*.—These two species, which are almost indistinguishable on the wing, are east and south in their distribution, though they extend throughout Uganda. Neave has pointed out that the white spot in the cell is considerably larger in specimens from British East Africa than in those from South Africa, and that there is a further increase in the size of this spot in the western part of the range, though perhaps his material from the eastern part of British East Africa was hardly sufficient to establish this last part of his argument. He further argues that this increase in the size of this spot is due to the influence of the western *A. Psyttalea*. However, so far as I know, this last does not cross the Rift Valley, and the difference in the size of this spot in specimens caught in Taita and those in Uganda is small. In Taita *A. albimaculata* always has the large patch in the centre of the

hind wing very pale ochreous, but this is not the case with those I have seen from Nairobi and the Kenia district. Personally, I have found *A. echeria* very much rarer than its congener, which, moreover, does not usually have the large patch in the hind wing paler than in southern specimens. I have examined scores of *A. albimaculata* in Taita and they are singularly uniform.

ACRÆINÆ

A large number of red and black species of the genus *Acraea* have different forms in East and West Africa, and these forms are sufficiently constant to be ranked as subspecies. Moreover, the differences are in almost every case of the same character. The eastern species are distinguished by the increase of the red and orange areas and the diminution of the black markings, and are quite parallel to the case of *Amauris niavius*. Amongst other species which exhibit this character the following may be mentioned: *A. Areca*, the eastern form of *A. Egina*; *A. acara*, compared with the western type, *A. zetes*; *A. natalica*, compared with its western form, *A. pseudEGINA*, and the central form, *A. abadina*, *A. thesprio*, and the western type, *A. perenna*; *A. pharsaloides*, compared with the type *A. pharsalus*; all these bear a considerable resemblance to each other, though they do not all belong to the same group. There are also other species which differ in exactly the same way, e.g. *A. neobule*, compared with its form *A. seis*, *A. rosa*, the eastern form of *A. quirina*, and even *A. rubescens*, the eastern form of *A. asboloplintha*, though the two forms of the last are only separated by the Rift Valley.

The western *A. Lycoa* has a series of subspecies in the intervening parts of the continent, and in East Africa is found in the forms *A. kenia* and *A. fallax*, which are much alike and differ from the type in that the pale markings are much more definite, but much more restricted. In this case it is probable that the species has been affected by mimicry of the commonest form of *A. Johnstoni*, which is always found with it and does not occur in West Africa. Another species which has a number of subspecies is *A. acrita*. The general tendency of these

subspecies proceeding from the north-east to the south-west is for a gradual increase in the size of the subapical black, and also of the median row of spots, so that the British East African *A. pudorina* looks utterly unlike the Angolan *A. Bella*.

In the district near Mpapua, some 200 miles west of Bagamoyo, I found two very different forms, or subspecies, of *A. acrita* flying on the same ground. By far the commonest of these was *A. acrita manca*, which is much like *A. acrita pudorina*, but has a discal row of spots on the fore-wing more or less well developed, and in the wet season has the central row of spots more pronounced. The other form was *A. acrita ambigua*, which has a south-western distribution, and in which there is a very pronounced black tip to the fore-wings and the subapical or discal row of spots is absent and the central row somewhat reduced. The females differ even more, as the ground colour of *A. acrita manca* is pale brown, and that of *A. acrita ambigua* almost black with a conspicuous white subapical bar, at any rate in the wet season; the dry season form of *A. acrita manca* is much more like its male, and I did not find *A. acrita ambigua* at that time. The species has not been recorded from any part of the western forest region, Angola not really belonging to the equatorial forests in which the western fauna is chiefly developed.

Another species which may be mentioned is *A. pseudolycia*, of which the type form, a whitish butterfly with black spots and other markings, is found in Angola. The British East Africa form, named *A. astrigera*, is a red and black insect and looks very different, greatly resembling *A. zetes acara*, to which it is indeed very closely allied. However, intermediate forms exist, and Dr. Eltringham has no doubt that they are conspecific.

The genus *Planema* has but two real East African species, *A. montana*, and *P. quadricolor*, the former is little more than a form of the southern *P. esebria*, the pale markings being of a deeper colour and more extensive.

Typical *P. quadricolor* is found at considerable elevations on Kenia and Kilimanjaro; it has, however, two subspecies, i.e. *latifasciata*, which occurs in Kavirondo and Uganda, and *itumbana*, which I found not uncommon near Mamboya,

some 150 miles west of Bagamoyo. These two forms resemble each other very closely, and have a much broader orange subapical bar than the type.

(*To be continued.*)

NOTES ON TORTOISES COLLECTED IN EAST AFRICA
1915-1919

BY ARTHUR LOVERIDGE

CINIXYS BELLIANA (GRAY)

Specimens of Bell's Hinged Tortoise were collected at Longido West (19/12/16), Ngoga (24/5/16), Kerogwe (6/7/16), Morogoro (9/4/18), and Lumbo (10/10/18). The last-mentioned specimen was a very large female, 207 mm. in length, the ovaries contained a mass of ovules from the size of a pea up to some measuring 28 mm. in diameter; there were about fifteen of these very large ones.

TESTUDO PARDALIS (BELL)

The Leopard Tortoise was met with at Ruwira (1/11/19), Namanga (19/1/16), Moshi-Arusha veldt (24/3/16), and Kerogwe (6/7/16). This is the very large box-tortoise, which is not uncommon on the Athi Plains and elsewhere. A shell which I found in Arusha measured 14 inches long, 9 inches broad, and 8½ inches in height. This was a male. The sexes may be readily told in this species by the turning down of the terminal shield (caudal) of the upper shell (plastron) in the male, and the reverse in the female.

TESTUDO LOVERIDGII (BLGR.)

This new species, recently described by Mr. G. A. Boulenger, was obtained at Dodoma, G.E.A., on December 8, 1918, and two subsequent days. Eight specimens were obtained. When I procured these specimens I took them for the rare *T. tornieri* Sieb., of which only three specimens are known (Njoro, B.E.A.; Russisi and Lindi, G.E.A.). *T. tornieri*, which is its nearest ally, however, never loses its ribs, is not so broad, and lacks the groove on the under-surface of the caudal shield.

The new tortoise is very remarkable for several reasons. When born the young has a domed shell and ribs like any other member of its genus of a similar age. As it develops, however, instead of the ribs broadening out and ossifying together to form a bony shell, they are absorbed into the system (osteolysis), so that the maturing tortoise has nothing to support its horny case except the backbone. The tortoises are much depressed and, as they are without a bony shell, quite soft to the touch. As the genus is one of the most specialised of even Chelonians, it is an extraordinary retrogression which abandons the shell as a protection. The explanation of this will be found in the kind of country in which they are found, and the habits of life developed in consequence. The country is dry and sandy, thornbush-scrub and rocky kopjes are scattered throughout. The tortoise seeks shelter beneath the boulders and rock-masses, the depressed shell enables them to push their way farther into these retreats than if the shell were domed; moreover, if they have warning that there is someone in the vicinity, they apparently take a deep breath, which enables them to get a better grip. All the specimens taken were found in such crevices, and it was noticeable if you came on them suddenly they were easily removed, but if your shadow darkened their retreat it was necessary to work them to and fro and use a little force ere they could be dislodged and withdrawn.

The specimens which I considered adults were all about 160 mm. in length, but Mr. Boulenger tells me that he is sure that they are little more than half-grown. The variation in colour and markings was pronounced. Males could be distinguished from females by their longer tails. A pair were presented to the Zoological Society after thirteen months captivity. Like both the foregoing species, I found they did well on a diet of lettuce or tender cabbage leaves; at one time, when these were unobtainable, bread soaked in jam was taken by them without demur.

CHELONIA IMBRICATA (LINN.)

A dead specimen of the Hawksbill Turtle was found washed up on the shore at Frere Town, Mombasa (20/5/18).

STERNOTHRÆUS SINUATUS (SMITH)

A head of this large water-tortoise was found bottled in a German house at Morogoro.

PELOMEDUSA GALEATA (SCHOEPF.)

Young female, measuring 83 mm. in length, was collected at Tabora (13/12/18), where they are probably not uncommon.

NOTES ON SALT CAVES IN LUMBWA DISTRICT—
BRITISH EAST AFRICA

BY A. KNIGHT BRUCE.

There are believed to be nine of these caves of any size in Lumbwa District, their names being :

- | | | |
|--------------|---------------|------------|
| 1. GITOI | 4. KIBARABARA | 7. SAUSIT |
| 2. KIBRISIN | 5. KIPTOI | 8. RIPTOIT |
| 3. KIBIPITEN | 6. CHOMA | 9. BAGAW |

The Lumbwa at the present day dig salt in these caves, which they remove in baskets, and feed to their cattle and sheep outside.

In Kibipiten the entry is made in the evening, the salt is dug out at night and removed in the morning. Apparently in most of the others, owing to the number of accidents which have occurred lately from falling rock, digging is confined to the entrance only.

NOTES ON BAGAW SALT CAVE, LUMBWA DISTRICT

This cave is situated near the top of the Escarpment which rises from the Nyando River on its left bank, between Lumbwa and Fort Ternan stations.

Its entrance is under a waterfall on the Sambula stream. It is difficult to arrive at even an approximate idea of its age, though the natives agree that it is not of any great antiquity.

Its origin is attributed to game being noticed nibbling at the face of the rock. Probably cattle followed their example,

until men, realising that they gained some benefit from the practice, began to dig the stuff and to feed their stock with it.

Till some four years ago the cave was free from rocks falling; now, owing to the number of fatal accidents which have occurred, digging is confined to the entrance only.

The tree near the entrance should be noticed—it is evidently of no great age, yet as evidently, since it was of mature growth, the action of the waterfall has removed all the soil from its base, which was *above* the level of the roof of the entrance to the cave.

The entrance is only some 4 feet high, but immediately on entering the height rises to above 8 feet, and a cave of very irregular shape, of an average width of about 40 feet, is disclosed. This continues for 150 yards, when the floor suddenly rises, and the cave bifurcates into the branches.

About 50 yards farther along each of these branches the passage was stopped by huge slabs of rock which had fallen down from above.

A considerable fall of rock had occurred the night before I entered, and many more slabs appeared to be on the verge of falling, and, as a space of only some 18 inches was left, further progress was impossible.

The nature of the walls varies—at the entrance the rock strata are not well defined, and the Exhibit B (called White and Red, Lumbwa Ngelel and Ngebirir) is found in patches.

Farther on, however, the strata become uniform—the rock (Exhibit C) lying in horizontal lines with Ngebirir between the strata, at distances of about a foot. But Exhibit A (called Black and White, Lumbwa Ngetoi) is found in patches.

The roof is formed of rock lying in strata all the way. Two supports have been left—off the first one Exhibit A was chipped.

No water was noticed in this cave. To reach the end is a reputed journey of 2–3 hours.

KIBIPITEN SALT CAVE

This cave is situated on the Kiptiget River, about 5 miles up-stream from the bridge over which the old bridle-path to Kericho crosses, and is about 6,500 feet above sea-level.

Its situation is practically the same as Bagaw, but the waterfall is higher.

The entrance is also low, but the height rises inside to about 12 feet, with an average width of over 60 feet. After running for 60 yards this cave also forms two branches, and the height decreases to about 3 feet; after following these for about 30 yards, I was in each case stopped by deep pools which had been formed by digging for salt.

No regular strata are found here as in Bagaw, the Exhibit A (Ngebirir and Ngelel) was found in patches in the rock, Exhibit C, which appeared to be of much the same nature throughout.

Exhibit B was taken from the entrance to the cave.

Exhibit D (Ngelel) was also found in patches.

I was able to obtain more definite information as to the age of this cave. Old wazee I questioned stated that within their memory it only entered the rock for a distance of 25 yards—their grandfathers started the excavation when they first came to that district.

Now it is supposed to take 2 hours to reach the end, but it should be remembered that progress is very slow, especially as the native only sees his way by lighting torches of twigs, and most of the way it is necessary to crawl on hands and knees.

GENERAL NOTES

Both the other caves visited (Gitoi and Riptoit) present almost similar features as those described above. (The former has already been described by Mr. C. M. Dobbs, in the *JOURNAL* of the E.A.N.H.S., vol. v. No. 10, p. 125.)

From inquiries made, the same remark appears to be true of these which I have been unable to visit.

In absence of expert investigation, I formed the following conclusions :

These caves have, at any rate, been mainly formed by the labour of man, and, though resulting from an industry somewhat alien to the Lumbwa character, do not represent such a heavy task as might be imagined. For instance, Kibipiten, say 50 years ago, was only 25 yards long, now it is

reported to take $2\frac{1}{2}$ hours to search the end, though I was unable to verify this fact. I should say, however, that this represents a mile at the outside—this, therefore, means a progress of about 35 yards a year, but personally I should not think it likely that this cave is a mile long, since the task of removing a basket filled with rock this distance would occupy nearly a day.

While crawling about in caves like these without any means of measurement, one naturally forms totally erroneous ideas of distance—apart from the usual exaggeration of native reports.

Again, the fact that these caves appear to be universally suffering from their roofs falling in, in the absence of any marked disturbance, hardly seems to point to their being of any great antiquity.

It was most unfortunate that these phenomena coincided with the investigation.

THE LUMBWA CIRCUMCISION AGES

By C. M. DOBBS

Early in 1918 I made some investigations into the circumcision periods of the Lumbwa, with a view to try and find out the ages of some of the old men in the district, and it has occurred to me that the results of my inquiries may be of interest to readers of the JOURNAL. From the investigations made, it appears that the main circumcision festivals of the Lumbwa take place about every five years approximately. As far as I can make out, a certain number of youths are circumcised every year, but the great majority are done about the harvest time, at these fairly regular intervals. Each circumcision age (Ibinda) has a special name of its own given to it, often from some extremely trivial circumstance that occurred about the time of the ceremony. This fact that the name given was often a topical one was very useful in fixing the exact date of several of the most recent ceremonies, and thereby finding the dates of the older ones. Below will be found a

list of the names of the various ages, with their dates (approximate, of course), and the circumstances leading to the adoption of the particular name in each case.

(1) Maina (1856). The origin of this name is not known, and all the representatives of this age are dead. The name 'Maina' is a very common one among the Lumbwa.

(2) Chuma (1861). The same remarks apply to this name as to the last.

(3) Sowee (1866). Only a very few old men of this age are left. The origin of the name is not known. Assuming that the natives are circumcised at about 12 to 15 years old, this would make these old men in 1918 about 64 to 67 years of age. As none of the previous age were said to be alive at all, it would appear that the maximum age reached by the Lumbwa native is something under 70 years.

(4) Kiptaimen (1871). This name was given because at that time some man went to dig salt for goats, and found that what he had dug was not salt, but only earth suitable for making pots.

(5) Kiptermesendet (1876). So called from a youth who cut a basket (mesendet) in anger when refused permission to be circumcised. One or two of the older chiefs belonged to this age.

(6) Koboloin (1881). So named owing to one of the youths starting to cultivate his field when he was about to be circumcised. (Pol or bol is the root of the verb 'to dig'.)

(7) Kimasiba (1886). This was the name of a district in Sotik where the circumcision festival took place. As far as I could make out, this did not mean that all the circumcisions took place there, but that some did, and for some reason or other the name of that particular district was given to that particular age.

(8) Kababocha (1891). This name was given because the youths circumcised this year had not reached puberty.

(9) Kipsiljoget (1896). So called because one of the youths made a sheath for his sword out of a skin, and as the hair would not come off the skin, he rubbed it off with ashes. (Joget is the sword-sheath).

(10) Tabarit (1901). This name was given because the

woman who cooked the food for the youths did not have her ears bored.

(11) Kosigo (1906). This name was given in the same way as Kimasiba (1886), from a district in Sotik where the ceremony was performed. (The office interpreter at Kericho and a number of the younger chiefs were circumcised in this year. This would make them a little over 24 years of age.)

(12) Kipsirgot (1911). So called because this was the first year in which the huts were properly counted. The first hut-counter was engaged for Lumbwa district in the early part of 1911.

(13) Buloo (1916). The way that this name, which is not a Lumbwa word at all, came to be applied to this particular age is rather interesting. When a native is registered he is made to put his thumb-impression on the contract form, having previously pressed it on the pad of *blue* ink. This is called by the Lumbwa 'chil buloo.' The year 1916 was marked by a large exodus of Lumbwa on to farms as squatters. These natives were all registered, and had to put their thumb-impressions on to contracts, and hence the name 'buloo' was given to this particular circumcision age. I had frequently heard one of my kitchen addressed by the other boys as 'Buloo,' and I never could make out why they did it till I discovered that he belonged to the 'buloo' circumcision age.

Although I made the most careful inquiries, I could find out nothing whatever about any circumcision age prior to 'Maina' (1856).

EARTHQUAKE SHOCKS

By C. W. HOBLEY

Information has been received that a severe earthquake shock occurred at Iringa, in German East Africa, at 7.45 A.M., on April 1, 1919, lasting about two minutes; some of the buildings being badly damaged.

Several earth tremors are also recorded from Dodoma, these occurred on May 13, at 2.40 P.M.

Severe shocks have occurred also at Neu Langenburg, and it is said that the station there is badly damaged ; unfortunately no information has been received as to date and time.

Earth tremors are also reported from Wilhelmstal on July 16, at 9.45 A.M., 1.9 P.M., and 11.30 P.M.

The recording of earthquake shocks is a matter of great interest, and members are asked to send in particulars of any that are felt, giving date and also the times of the series of tremors or shocks, for earth tremors never occur singly. Without a seismograph, however, it is possible that only one of the series may be perceptible to the senses.

It may be of interest to record the following information regarding some recent earth tremors :

May 16, 3.55 P.M.—Two shocks were felt at Voi in quick succession and lasting about half a minute. These were followed by a slighter quiver about 2 minutes later. The station-master's house and dak bungalow were slightly damaged.

May 17, 8.5 P.M.—Another slight shock at Voi, and again another during the night, time not recorded.

May 17, at about 8 P.M.—Shock felt at Masongoleni, the spring forming the source of the Masongoleni River has been affected and it has ceased to flow.

One of the above earthquakes has closed a spring on the Kidai Fibre Works at the N. of the Taita Mountains, and caused it to reopen in another position.

Masongoleni is about 70 miles N.N.W. of Voi, and Kidai is about 20 miles N.W.W. of Voi.

CHEETAHS ON THE UGANDA RAILWAY

I am a loco. driver, and on Thursday, June 19, 1919, I was running a passenger train from Nakuru to Kisumu.

In the afternoon we left Muhoroni Station at 4.35 P.M. to go to Kibigori Station, and, as perhaps you might not know, there are quite a considerable number of bridges between these stations ; the bridges are not 'flooded,' but simply have the sleepers laid on the girders, and the rails on top of the sleepers, the sleepers being about 18 inches apart, so this bridge at mile

551 must be about 90 to 100 feet long, but not very high. The fireman just saw the animals and shouted to me 'Simba, Bwana,' and then I leaned out and saw them. There were three, and it would have been easy enough for them to have jumped off the bridge, or, if the bridge had been floored, to have run off in front of me, but as they had to pick their way carefully over the spaced sleepers, the engine caught them up, knocked one clean off the bridge, one other got caught by the cow-catcher and rolled under the train and dropped *through* the sleepers to the ground under the bridge, minus his head, and the other must have jumped off and got away.

I stopped the train and picked up one and took it to Kisumu; and at Kibigori Station Mr. MacGregor Ross, of P.W.D., who was travelling in the train, took a snapshot of this one; he promised to send me a copy, but probably, as he explained, the light was very poor and perhaps it turned out a failure.

I am sorry that I named the animals wrongly, they were not *Leopards* but *Cheetahs*; please correct my permit.

The skins have been sent to 'Dawson,' Nairobi, to be cured.

Hoping I have made the matter clear and thanking you very much for the 'permit,'

I am, &c.,

(Signed) E. HOLLOWAY, *Loco. Driver, U. Ry.*

DESICCATION IN AFRICA

(To the Editor)

The March number of the N. H. SOCIETY JOURNAL has just reached me. With reference to my article on desiccation, I notice that the paragraph on Lake Shirwa is not the copy of my corrected manuscript. The printed paragraph says:

'The surrounding country and flats towards Nyasa invite the conclusion that Shirwa was an arm of Nyasa at no very remote date.'

Reference to my notes produced this alteration:

'*Lake Shirwa, being some 200 ft. higher than Nyasa, must therefore be regarded as a mountain tarn.*'

(No manuscript here to refer to exact wording.)

The point is a small one, but important, and I would be glad if you could include the correction in the next number of the JOURNAL.

In following up the literature of the subject of African desiccation, I have culled the following most interesting information, which carries on from the latitude at which my article terminates.

From Sir H. H. Johnston's 'George Grenfell and the Congo':

1. 'Between this section of the Lualaba and the Lomami on the west, the land is very swampy and the many marshes are undoubtedly the remains of a former lake. Grenfell found the altitude of the Lomami at S. lat. 1' 30" to be only 1,493 feet.'

2. 'Between the Lowa and the Lulindi on the south there is a considerable tract of marshy country, almost like an indefinite lake. This may represent the Lake Ozo of Arab reports, which occasionally appeared on African maps in the 'seventies of the last century and was confused in the minds of geographers with the actual Lake Kivu. It is probable, however, that at one time there was a large shallow lake in this region, completely separated from Lake Kivu, however, by a high mountain range, but united across the Congo with the Lomami River.'

3. 'The Lualaba between Ankoro and Lake Kasate has a slow current, and flows through a swampy region beset with many lakes and pools. *Here, no doubt, was once a large lake, three or four times the size of Bangweulu.*'

As the subject is one which greatly depends on the collection of individual notes and observations, I trust you will find space for the above in the next number of the JOURNAL.

Yours sincerely,

R. R. HARGER.

BABOONS ATTACKING CHILDREN

(To the Editor)

Re Mr. Blaney Percival's note concerning Baboons in your July number.

An instance of a baboon attacking a human child came to

my notice in 1917, when a Kikuyu child of a squatter on the late Mr. R. F. C. Thompson's farm was severely bitten and scratched by a baboon. The child was brought to me for treatment, and the mother told me that the same baboon had mauled another child not long previously. The baboon did not attempt to carry the child off, but attacked and injured it on the ground.

Mr. R. E. Dent told me of another instance, of which I believe he was an eye-witness: a native child in South Africa was carried up by a baboon on to a ledge on the face of a precipitous 'krantz.' A native, lowered from the top of the 'krantz' by a rope, recovered the child unhurt.

Yours faithfully,

G. A. S. NORTHCOTE.

FURTHER NOTE ON CROCODILES

By C. W. HOBLEY

In No. 14 of the JOURNAL I enumerated certain facts and experiences connected with these Saurians.

As printed, it is stated that I had personally shot a specimen 18 ft. 6 ins. long. I here take the opportunity of correcting this measurement, which is a printer's error, for in my manuscript the measurement was given as 16 ft. 6 ins.; this is correct.

When recently in South Africa, the Curator of the Cape Museum called my attention to the measurements of specimens given in my paper, and he said, as far as his experience went, a crocodile of 18 ft. had not been verified, at any rate in the southern half of Africa.

I accordingly communicated with Mr. B. Eastwood (the railway officer referred to in my article) for further particulars of the crocodile shot by the Duke of Mecklenburg.

He has kindly replied as follows: 'With reference to the crocodile killed by the Duke of Mecklenburg. It was shot not far from Mwanza in May 1905; he told me that the length was $6\frac{1}{2}$ mètres, which is practically 21 ft. 6 ins. The Duke

was out twice, this was the first time, and we travelled from Mwanza to Bukoba together in, I believe, s.s. *Winifred*.'

I also communicated with Mr. R. J. Cuninghame, who is one of the greatest authorities on the fauna of Africa, and well known to most of the members of the Society. He states: 'The only authentic measurement of a big crocodile that I can vouch for was one of my own, it was 18 ft. from tip of snout to tip of tail, measured between perpendiculars. Locality Fajao, by the Murchison Falls, Victoria Nile. Date 1900.'

This is first-hand evidence from an acute observer, and it may therefore be accepted that crocodiles of at least 18 ft. undoubtedly exist in equatorial Africa.

It would be interesting if some other members could submit actual measurements from their own experience.

LUMBWA CAVE EARTH: ITS ATTRACTIONS FOR DOMESTIC ANIMALS

BY PROF. E. P. CATHCART, *Glasgow University*

I am of the opinion that, as surmised by Prof. Gregory, the value of the Lumbwa Cave material lies in its content of sodium.

The animals involved are herbivora, which normally consume a diet rich in potassium, but poor in sodium. The fact that such a salt-rich diet gives rise to a craving for a supply of sodium is well known.

So far as I know, there are two hypotheses offered in explanation of the facts, Köppe's and Bunge's. Köppe holds that it is due to the fact that in plants the inorganic salts are in organic combination (Köppe, '*Physikalische Chemie in der Medizin*'), only a small amount being present in soluble dissociable form. The demand, on this hypothesis, is then for available salts. Bunge ('*Text-book of Physiological and Pathological Chemistry*'), supporting his contention by experimental work, maintains that the ingestion of large quantities of potassium salts, due to the resulting interaction between the

inorganic salts in the organism, leads to the excretion of abnormal amounts of sodium in the urine, with the result that this loss has to be made good from outside supplies.

Bunge has drawn attention to many interesting points. Domesticated Carnivora, *e.g.* dog and cat, prefer unsalted food to salted food, whereas domesticated Herbivora are very fond of salt. So far as observations go, the same is apparently true for wild animals; the animals which flock to 'salt-licks' are the Herbivora. It cannot be that there is a real shortage in the intake of sodium in the food (the hypothesis of Köppe must, however, be remembered here); the Herbivora probably consume, pound for pound weight per animal, as much sodium as the Carnivora. But, as Bunge points out, the Herbivora take in their food 'at least three or four times as much of salts of potassium as the Carnivora.'

Bunge further supports his contention by reference to the human race. He collected a large amount of information from various sources, and he holds that he gets general support for his hypothesis (see, for full details, his paper 'Ethnologischer Nachtrag zur Abhandlung über die Bedeutung des Kochsalzes u.s.w.,' *Zeit. f. Biol.* x, 1874, iii). He reaches the general conclusion that 'it appears to be a universal rule that in all times and in all lands those people who live entirely upon animal food, either have never heard of salt, or, if they possess it, avoid it; whereas the people whose staple food is vegetable have the greatest desire for it, and regard it as an indispensable article of diet.' It is said that the Masai warriors, who are reported to live almost exclusively on a meat diet without salt, regard blood, which is rich in sodium ($K_2O : Na_2O :: 2 : 19$) as a great delicacy. You will be able from your own experience to confirm or refute this statement.

This appreciation of the relation of salt to the nature of the diet is of very old standing, as in ancient times it is said that sacrificial animals were offered to the gods without salt, whereas the fruits of the field were always given accompanied by salt.

It is interesting to note in this connection that one of the few really important vegetable foods, which is poor in potassium, is rice (containing as it does about six times less K than the

cereals (wheat, &c.), ten to twenty times less K than peas, beans, &c., and twenty to thirty times less K than the potato). Hence people who live on rice as their main vegetable food should require less sodium than others who live on, say, peas, beans, lentils, maize, &c. This I believe is the case. The following data (content of $K_2O : Na_2O$) may be of interest :

Per 1,000 grms.	K_2O	Na_2O
Rice	1 gm.	0.03 gm.
Wheat, barley, &c.	5-6 grms.	0.1-0.4 „
Peas	12 „	0.2 „
Hay	6-18 „	0.3-1.5 „
Clover	23 „	0.1 „
Potato	20-28 „	0.3-0.6 „

It is evident, then, that the case is pretty well made out for the Herbivora demanding a larger supply of sodium salts. I gather that there are no 'salt-licks' in the country in which the Lumbwa Cave is situated. Hence the avidity with which the cattle consume the relatively sodium-rich material.

There is, however, one difficulty in this explanation. I understand that animals become excited and anxious to get to the cave a long way off. This is suggestive of an odour, and sodium salts are, so far as I know, devoid of smell. Hence the animal does not get excited about the sodium.

I do not think it likely that the material is consumed as an antacid. Nor, as the animals are Herbivora, and presumably consume large quantities of cellulose, do I think that the material is ingested as intestinal ballast for irritative purposes. On the other hand, the suggestion that its consumption has something to do with 'discouraging intestinal parasites' is extremely interesting, and may be well worth following up. We know practically nothing about the influence of the environment on the growth of intestinal parasites of any kind.

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EAST AFRICA AND UGANDA NATURAL HISTORY SOCIETY

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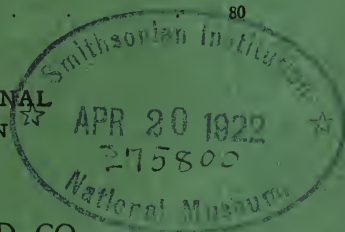
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ACTING EDITOR OF JOURNAL

DR. V. G. L. VAN SOMEREN



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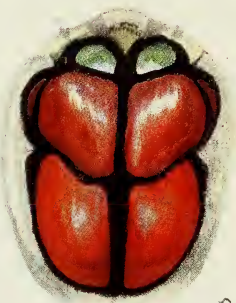
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ON PHYTOPHAGOUS COLEOPTERA OF THE FAMILY CHRYSOMELIDÆ

BY A. F. J. GEDYE, F.E.S., Curator of the Nairobi
Museum

INTRODUCTION

The *Phytophaga* form an extensive group of beetles, including something like 40,000 species; this, however, must be only a small portion of those existing on the globe.

The term *Phytophaga* is restricted by many taxonomists to the *Chrysomelidæ*, but in the opinion of the majority it is impossible to satisfactorily separate the *Longicornia* from the group. The *Lariidæ* (*Bruchidæ*) are also considered, by some, to form a family of *Phytophaga*, but a study of the nervous system shows it to be more concentrated and altogether more highly specialised than that of the other families of *Phytophaga*. From these considerations it is perhaps advisable to place the *Lariidæ* in the *Rhynchophora*, whose internal morphology is apparently of a more recent and advanced type.

As before stated, the two families of *Longicornia* cannot be separated from the *Chrysomelidæ* on any definite characters, although an acquaintance with the general facies of the families would, in most cases, prove sufficient for mere differentiation.

Jacoby ('Fauna Brit. Ind.: Coleoptera,' II, 1908, p. 3) states that usually, in the *Longicornia*, 'the shape is very elongate, the head projecting and prominent, the eyes oblique and more or less divided, and the antennæ peduncular, these organs at the same time rigid and tapering at the apex. All these structures are not as a rule found in the *Chrysomelidæ*.'

We will therefore consider here the *Phytophaga* as containing three families which may be distinguished, according to Fowler,¹ as follows :—

¹ Fowler, *Fauna Brit. Ind.*, Gen. Introd., p. 177.

- I. Antennæ short or moderate, not inserted on frontal prominences ; tibial spurs usually absent . . . CHRYSOMELIDÆ.
- II. Antennæ usually long or very long, frequently inserted on frontal prominences ; tibial spurs distinct.
- (a) Head in front oblique or subvertical . . . CERAMBYCIDÆ.
- (b) Head in front vertical or bent inwards below the thorax . . . LAMIIDÆ.

It is proposed, in the present paper, to consider the *Chrysomelidæ*, with general remarks on their habits, structure, and classification, and any notes, that are known or available to the writer, with reference to their occurrence in East Africa and Uganda.

FAMILY CHRYSOMELIDÆ

Form variable ; head prominent or moderately so, and inserted in the pronotum as far as the eyes ; antennæ moderately long, variable in shape and insertion, usually eleven-jointed and moniliform (shaped as if formed by beads) ; pronotum with or without lateral margins ; elytra usually covering abdomen, but sometimes leaving the pygidium exposed, upper surface usually bare, often brightly coloured and metallic ; legs variable, tarsi pseudotetramerous.

The *Chrysomelidæ* form an enormous family of over 20,000 known species, and it is probable that, when the family has been thoroughly worked in the tropics, the above number will not form a fifth of the total existing species.

The beetles are, without exception, plant-feeders both in the larval and perfect states. Many of the species are of considerable economic importance as pests of cultivated trees and shrubs. A notable instance is that of the Colorado Potato Beetle (*Doryphora decemlineata*), which caused so much destruction in North America some years ago.

Chrysomelidæ can best be captured by beating trees and

bushes into a net or umbrella, and by sweeping grasses and any kind of herbage; damp vegetation near the banks of streams being particularly productive.

Very little is known of the life history of the family; altogether about 100 species have been worked out, most of these being European. The special modifications of the different larvæ and pupæ will be alluded to under the different families. The following table of larvæ is that given by Chapuis ('*Genres des Coléoptères, Suites à Buffon*,' X, 1874, p. 15), with alterations by Sharp ('*Cambridge Nat. Hist.*,' Vol. VI, p. 279), and quoted by Fowler (*op. cit.*, p. 182).

I. Larvæ with the body uncovered.

A. Larvæ elongate, subcylindrical, whitish, living on or in the stems of aquatic plants under water; pupæ also subaquatic, contained in cocoons fixed to the roots of the plants . . . DONACIINÆ.

B. Larvæ mining, more or less elongate, sublinear or narrowed at each end, undergoing their metamorphoses on the plants . . . HISPINÆ and some HALTICINÆ.

C. Larvæ short, oval, very convex above, often more or less brightly coloured, or dark metallic, living exposed on the plants and undergoing their metamorphoses on the plants or in the ground . . . CYCLICA (most).

II. Larvæ with the body protected by excrement.

A. Larvæ short, oval, very convex above, dark coloured,

without any special apparatus for carrying the excrementitious matter, undergoing their metamorphoses in the ground . . .

CRIOCERINÆ

(in part).

B. Larvæ short, oval, somewhat depressed, spiny, with the excrement supported and attached by a special apparatus, undergoing their metamorphoses on the leaves .

CASSIDINÆ.

III. Larvæ elongate and whitish, with the abdomen curved, inhabiting portable tubes or cases and undergoing their metamorphoses in these . . .

CLYTHRINÆ (and most CAMPTOSOMES).

The classification of the perfect insects is but little advanced in spite of the large number of forms which have been described. The best arrangement, however, is perhaps that adopted by Jacoby (*op. cit.*, p. 3).

I. Mouth placed anteriorly.

A. Antennæ widely separated at base; elytra of hard texture.

*Intermediate ventral segments not medially constricted; pygidium not exposed.

(a) Thorax without distinct lateral margins, head produced, eyes prominent, prosternum exceedingly narrow . . .

EUPODES.

(b) Thorax with distinct lateral margins (rarely without), head not produced, eyes not prominent, prosternum broad . . .

CYCLICA.

- *Intermediate ventral segments
constricted; pygidium
usually exposed . . . CAMPTOSOMES.
- B. Antennæ not widely separated
at base, generally closely
approximate; elytra more
or less soft in texture . . . TRICHOSTOMES.
- II. Mouth not normal, small, hidden
or nearly so CRYPTOSTOMES.

Although the distinguishing features in the above table between the different groups may not in all cases appear very clear, it may be remarked that a practical acquaintance with a few selected types will, in nearly all cases, enable the beginner to relegate his species to the different groups.

Unfortunately all the literature on East African *Chrysomelidæ* that has appeared is widely scattered in odd papers in various publications. However, a fair number are described by Kolbe in 'Deutsch-Ostafrika: Thierreich,' by Jacoby in the *Proc. Zool. Soc.*, and by Weise in various German publications.

I may add that I shall be delighted to give what help I can to any members of the Society who feel inclined to take up the study of this fascinating group of beetles.

DIVISION I. EUPODES

This division of *Chrysomelidæ* contains three sub-families: *Sagrince*, *Donaciinæ*, and *Criocerinæ*. The *Donaciinæ* are remarkable on account of living a semi-aquatic existence, wholly aquatic in the case of the larvæ. The sub-family, however, is characteristic of the temperate zone, and I can find no record of its occurrence in Eastern Africa.

The *Sagrince* and *Criocerinæ* are, however, represented in our region, and may be roughly distinguished as follows:—

- I. Size large; posterior femora strongly
thickened SAGRINÆ.
- II. Size small; posterior femora not
strongly thickened CRIOCERINÆ.

The *Sagrinæ* are moderately large insects, often brightly metallic, with strongly dilated posterior femora. It appears that the use of the latter organs is not for saltatorial purposes, as the insects are frequently found suspended from stems and branches, head downwards, and supported by the hinder femora. Species of *Sagra* are common on the west coast of Africa, and I have taken a bright purple species in Natal, but few seem to be recorded from our territory. A variety of *Sagra murrayi*, Baly, is recorded by Kolbe¹ from Tanganyika Territory, and from Ruwenzori by Gahan,² and the Nairobi Museum possesses a brown, slightly metallic species from Ruiru.

The *Criocerinæ*, however, are largely represented in East Africa and Uganda, most of the species belonging to the great genus *Lema*, which contains over 300 species, occurring in most parts of the world. They are small, brightly coloured beetles, of hard integument, usually to be found in damp places.

In the collection of Coleoptera in the Nairobi Museum there are five or six unidentified species of *Lema* from various parts of Kenya Colony ; there is also a specimen of *Lema chalcoptera*, Lac, a small, brightly metallic æneous species from Tanganyika Territory.

Some of the larvæ of the genus *Crioceris* have the power of covering themselves entirely with excrement, which, however, can be cast off at will. According to Sharp ('Cambridge Nat. Hist.,' Vol. VI, p. 281), some of the imagines have the power of stridulating by means of two contiguous areas situated on the last dorsal segment of the abdomen.

DIVISION II. CAMPTOSOMES

This division is remarkable on account of the peculiar structure of the abdomen, which appears to be connected with the habit of forming a case to envelop the egg.

The division contains six sub-families—viz., *Megascelinæ*, *Megalopinæ*, *Clythrinæ*, *Cryptocephalinæ*, *Chlamylinæ*, and

¹ *Deutsch-Ostafrika*, IV, 'Coleoptera,' p. 325.

² *Trans. Zool. Soc.*, Vol. XIX, pt. ii, p. 216.

Sphaerocarinae. We will here consider only the *Clythrinae* and *Cryptocephalinae*, as they are best represented in our region. They may be roughly distinguished as follows :—

- I. Form more elongate, less convex ;
rarely metallic and iridescent ;
eyes inserted higher on head . CLYTHRINÆ.
- II. Form less elongate, more convex ;
often metallic and iridescent ;
eyes inserted lower on head . CRYPTOCEPHALINÆ.

The *Clythrinae* are often moderately large insects decorated with conspicuous spots and stripes on a lighter background, and can be sometimes beaten from trees in the vicinity of ants' nests.

The beetles comprising the sub-family *Cryptocephalinae* are often of great beauty, and when seen in the net give one the impression of 'living jewels.' They are exceedingly wary, and often the least sound will cause them to drop from trees and bushes into the long grass, rendering further search futile. *Cryptocephaline* larvæ are, according to Weise,¹ most remarkable ; they inhabit portable cases with the abdomen curled against the sternum. They can only emerge from the cylindrical case as far as the first abdominal segment, and, in consequence, progress with a curious jerky motion. A pretty little *Cryptocephalus* has recently been taken by the Rev. K. St. Aubyn Rogers at Sagalla, and presented by him to the Nairobi Museum.

DIVISION III. CYCLICA

To this division belong the mass of the *Chrysomelidæ* ; the species are most permanently brilliant in their colours, although they are surpassed in life by some of the *Cassidinae*. Three sub-families are contained in this group—viz., *Lamprosominae*, *Eumolphinae*, and *Chrysomelinae*.

Some of the *Chrysomelinae* are serious pests of vegetation, such as *Doryphora* (*Leptinotarsa*) *decemlineata*, before mentioned, also the common 'Mustard Beetle' (*Phaedon cochleariæ*) ;

¹ Weise, *Naturg. Ins. Deutsch.*, VI, p. 139.

the larvæ are, however, in many cases kept down by parasitic Hymenoptera of the family *Braconidæ*.

The *Lamprosominæ* are not, I believe, represented in our fauna. The *Eumolphinæ* and *Chrysomelinæ* may be separated as follows :—

- I. Form more elongate, less convex ;
 pronotum narrower ; mandibles
 vertical or sub-vertical *EUMOLPHINÆ*.
- II. Form ovate, very convex ; pronotum
 broader ; mandibles rarely vertical
 or sub-vertical *CHRYSOMELINÆ*.

The *Eumolphinæ* constitute a large sub-family of very brilliant species ; there is a large amount of individual variation amongst its members, one species sometimes being represented in blue, green, red, gold, and all the intermediate shades. The sub-family is well represented in East Africa and Uganda, although the family is very little worked, and there is no doubt that a large number of new species will yet have to be described. One of the most beautiful genera is *Corynodes* ; they love damp places, and I recently took a fine species by the side of a stream on the road between Kampala and Entebbe. Some species affect trees in drier situations, and I recently beat a large number of a pretty red and black species from acacia trees at Thika, near Nairobi. When discovered they are by no means agile, and affect death, although their coloration is so conspicuous that any chance of escape is slight.

The beetles comprising the sub-family *Chrysomelinæ* are typical Chrysomelids, and very numerous in practically all parts of the globe. In many cases different species are severely attached to distinct plants, and to be found must be searched for in their various habitats. I was once collecting at Kimberley, South Africa, in a field in which there were perhaps six species of plants in great abundance growing round a dried-up 'vlei' ; five of these plants harboured, respectively, the same number of *Chrysomelinæ*, and in no cases were they found to be infringing on each other's habitat.

The Chrysomeline larvæ feed in most cases on the plant

which the adult frequents; they are very sluggish in their movements, and are generally of a pale and insipid colour.

The genus *Plagioder*a appears to be moderately common in our region. Several species are recorded by Gahan (*op. cit.*, p. 217) from the western portion of Uganda; these are, however, probably absent from Kenya Colony, as it is a well-known fact that the fauna of Uganda bears a closer relationship to that of West Africa than to the eastern portion of the continent. The Nairobi Museum possesses examples of *Plagioder*a *egregia*, Gerst., from Kilindi in Tanganyika Territory. *Ceralces* is a rather inconspicuous genus of itinerant species occurring throughout our region. The Museum possesses specimens of *Ceralces natalensis*, Baly, from Dar-es-Salaam. This species (as its name implies) was originally recorded from Natal, and it will be found that there is a marked similarity between the coastal faunæ of the whole of the East African coast.

DIVISION IV. TRICHOSTOMES

The *Trichostomes* include a vast assemblage of smaller forms comprised by two sub-families, the *Galerucinæ* and *Haltinginæ*. Although these two sub-families differ rather greatly in external form, they have several characters in common.

- I. Exo-skeleton softer; legs slender,
weaker, and feebler, and not
adapted for jumping GALERUCINÆ.
- II. Exo-skeleton harder; legs shorter,
stouter, and adapted for jumping,
posterior femora visibly dilated . . . HALTINGINÆ.

The *Galerucinæ* are probably the most abundant group of the *Chrysomelidæ*, and generally form a feature of the contents of the sweeping net. It may be well to remark here that it is always advisable to examine the contents of one's net, if possible, in the shade, as the beetles do not then so readily take to the wing or make use of their saltatorial powers; this applies not only to the *Chrysomelidæ*, but to other families of Coleoptera, particularly to the Malacoderms and arboreal Heteromera.

The *Galerucinae* are well represented in East Africa and Uganda, and much work remains to be done amongst the group.

Among four species of *Galerucinae* submitted to the British Museum by Sir Harry Johnston, Gahan records two as new to science (Johnston's 'Uganda Protectorate,' Vol. I, p. 464). The sub-family is also of economic importance, and *Idacantha magna*, Weise, is recorded by Dr. Aulmann¹ as a serious pest of coffee in Tanganyika Territory. Out of fourteen *Galerucinae* captured by the Zoological Expedition to Ruwenzori, Dr. C. J. Gahan describes no less than eight as new.² This affords another striking proof of how abundant *Galerucinae* are, and of the extreme probability that many new forms will yet be discovered by means of careful collecting. Many Galerucine Coleoptera are of dull and inconspicuous coloration. The genera *Oides* and *Cerochroa* are notable in this respect, and females may often be taken with their abdomens enormously distended by eggs; when in this condition they are very clumsy in their movements, and make no effective effort to escape. A very beautiful little Galerucine occurs around Nairobi which might be almost considered the national beetle of Belgium. The head and legs are a pale testaceous, while the elytra consist of three transverse fasciæ alternating in black, red, and yellow. *Agelastica* is a genus of rather uninteresting beetles of an obscure appearance; they are not uncommon in East Africa in damp places. *Monolepta* is a very large genus of small, prettily variegated species occurring throughout Africa; *M. leuce*, Weise, and *M. lineata*, Karsch., are to be taken with ease around Nairobi. Once while sweeping Composite plants at Kampala, Uganda, I was astonished to note that at every sweep myriads of small yellow beetles flew from my net; on examination they proved to be small *Galerucinae* of the genus *Hyperacantha*.

The *Halticinae* are a most interesting sub-family of small beetles gifted with extraordinary (for their size) powers of leaping, of which they do not hesitate to make use. They are

¹ Aulmann, *Die Fauna der deutschen Kolonien*, Heft 2: 'Die Schädlinge des Kaffees,' 1911, p. 51.

² *Report on the Zoological Expedition to Ruwenzori*, pt. ii, pp. 218-224.

exceedingly common in our region, and may be taken at almost every movement of the net.¹ The ancient genus *Haltica* of Linnæus seems to have a worldwide distribution, and can be taken in profusion by the sides of East African streams. They are very variable, and are of some importance in the study of variation. The Nairobi Museum possesses some interesting series of *Haltica oleracea*, L.: a large number of specimens from Ruiru are, without exception, of a mauve colour; specimens from the Karura Forest, Nairobi, are totally greenish; while I have taken specimens at the Nairobi River of two aberrations—viz., a distinct cyaneous blue and of a reddish purple. As an instance of the wide distribution of this species I may mention that I have taken it commonly in various localities in the south of England; also in eight widely separated localities in South Africa. A thorough study of this remarkable little species would probably be of interest. Many of the sub-family are of an obscure testaceous colour; the Museum possesses specimens of *Aphthona marshalli*, Jac., a minute yellow beetle, from 'German' East Africa. One or two African genera are large and conspicuous, notably the genus *Podagrica*, which contains rather large species of hard and compact integument, usually variegated with black spots or stripes on a yellow background. This genus is widely distributed in Africa, and the Museum possesses specimens from Sagalla, and I have taken the species commonly at Isipingo in Natal.² Regarding the economic side of the family, the dreaded 'Turnip Flea' (*Phyllotreta*) belongs to this group, and many others which have not received such euphonious appellations as the former name.

DIVISION V. CRYPTOSTOMES

This division contains some very peculiar beetles, on account of the extraordinary structure of the exo-skeleton. It is the smallest division of the *Chrysomelidæ*, and the two sub-families,

¹ The Nairobi Museum will be very glad to receive any specimens of *Halticinae*, however common, in any number. The Museum will also be pleased to receive other *Chrysomelidæ*.

² Dr. van Someren has recently taken a species at Eldoret on the Uasin Gishu Plateau.

the *Hispinæ* and the *Cassidinæ*, may be distinguished as follows :—

- I. Form oblong or elongate ; head not covered by pronotum ; elytra usually armed with spines, or the dorsal surface is at least rugose . *HISPINÆ*.
- II. Form ovate or hemispherical ; head always covered by pronotum ; elytra not armed with spines, elytral epipleuræ strongly expanded *CASSIDINÆ*.

The *Hispinæ* are a small and remarkable sub-family ; the greater portion of the species belong to the genus *Hispa*, the members of which are armed with often long and curious elytral spines. The antennæ are inserted very closely together, and the tarsal claws are very short. Very little is known of Hispine larvæ or of the complete metamorphosis ; Perris (*Ann. Soc. Liège*, X, 1855, p. 260) has worked out the life-history of the single European species, *Hispa testacea*. The larvæ feed on the parenchyma of the leaves of *Cistus salvifolius*, and they only rupture the epidermis of the leaves when wishing to remove to a fresh habitat. The habits of some of the large exotic species are probably very different, and, unfortunately, nothing appears to be known as yet, although the recently published volume of Maulik ('Fauna Brit. Ind. : Cassidinæ and Hispinæ') may contain some fresh data. Species of *Hispa* occur freely near Nairobi, in the Ngong Forest, and in other parts of East Africa and Uganda. I have recently taken a beautiful blue metallic species, armed with long black spines, from reeds at the base of the Chania Falls, Thika. It is difficult to speculate as to the function (if any) of the curious armament of the *Hispinæ*. Whether it is formed for protection—for its structure would certainly make it unpalatable, and probably intimidate its enemies—or is the result of some cell stimulus as an example of over-specialisation, is rather difficult to decide in the present state of our knowledge.

The *Cassidinæ* are an interesting sub-family of moderate extent. They are usually shield-shaped or hemispherical,

with greatly expanded elytral margins. While alive they surpass any other *Chrysomelidæ* in beauty and brilliance of colouring; it is deplorable, however, that after death these colours quickly fade, leaving us with a drab, dull yellow insect. These colours would probably be retained if the elytra could be kept moistened with glycerine or spirits of wine; often an old specimen can be rejuvenated for a time by soaking in water.

Cassidinæ, or 'Tortoise Beetles,' are well represented in East Africa, and although the species are not as fine as those of South America, some very gorgeous forms occur. The genus *Aspidomorpha* is perhaps the most extensive in this country, and several species are recorded by L. Ganglbauer ('Insekten aus Deutsch-Ostafrika Kol.,' p. 25) from Tanganyika. The Nairobi Museum possesses one or two fine species from Uganda, and Gahan (*op. cit.*, pp. 224 and 464) records further interesting forms from the same country.

The larvæ and pupæ of the *Cassidinæ* are some of the most wonderful of Coleopterous forms. The larvæ have the peculiar habit of covering themselves with their excrement; this is not free as in the *Criocerinæ*, but held firmly by a forked appendage arising from the posterior extremity of the abdomen. The excrement can in some species be raised and feebly waved with a vertical motion, perhaps with the intention of frightening its enemies. While recently collecting on the shores of Lake Victoria, at Kisumu, I came across a small patch of arid ground on which were growing some small shrubs with broad, thick, light-green leaves.¹ On examining these plants I noticed a species of *Aspidomorpha* (?) in all stages of its development; the most minute larvæ seen were entirely of a bright yellow colour, with a small portion of excrement on the dorsal surface, which, as soon as I advanced my hand, the insect waved slowly in a vertical plane. Further advanced larvæ had, naturally, a larger piece of excrement which assumed a definite pattern, and the bright yellow of the body had given place to a darker brown. The pupæ were also situated on the leaves, and bore no resemblance to an insect: they appeared as merely dry spots of excrement, dark grey in colour, only the whole formed into a fantastic pattern. The imagines were also present; they appeared very restless,

¹ Probably a species of *Solanum* ?

and took to the wing at the least opportunity. They were bright little oblong-ovate insects, the elytra being decorated with red spots surrounded by black rings.

CONCLUSION

This concludes a very brief survey of the Coleopterous family *Chrysomelidæ*. Our knowledge of the group is as yet so little advanced that any further details with reference to distribution, etc., are impossible.

Perhaps it will not be correct to conclude this paper without a few words upon the subjects of mimicry and 'warning coloration,' which seem to so agitate the scientific world at the present time. It is a well-known fact that the *Coccinellidæ* or 'Ladybirds' are furnished with a very conspicuous scheme of coloration—*pro exemplo*, bright elytra often adorned with striking spots and stripes. It has, I believe, been proved that the *Coccinellidæ* are decidedly distasteful to birds or other animals, in the same way that *Acræine* butterflies are ignored after a primary taste. In the case of the *Coccinellidæ* our knowledge is perhaps a little more definite: anyone who is accustomed to handling the beetles knows that very often the insect exudes a yellowish fluid from between the bases of the pronotum and elytra. Exudations of this kind have been definitely proved to be distasteful to other animals (notably in the large Orthoptera and 'ground-beetles' (*Carabidæ*)).

Certain *Chrysomelinæ* of the genera *Chrysomela*, *Doryphora*, and others are coloured in a very conspicuous manner, such as spots and stripes in the same way as the *Coccinellidæ*; in many cases *Chrysomelinæ* marked in this way can be separated from the *Coccinellidæ* only by a careful examination of the legs and antennæ. Therefore it is not difficult to imagine that marauding enemies are also mistaken, and, in consequence, the innocent *Chrysomelinæ* are left quietly alone, free from the horrible prospect of sudden death! Therefore, according to Professor Poulton and other advocates of the theory, the *Chrysomelinæ* mimic the *Coccinellidæ* for the sake of preservation, and adopt the 'warning coloration' of the latter family. We do not wish to discuss the validity or otherwise of this

interesting question, but will refer our readers to the writings of Poulton, Marshall, Beddard, and particularly to Wallace's chapters in 'Darwinism.'

I would like to mention one adverse but interesting fact with reference to this theory, which is recorded by W. L. McAtee in a paper written in 1912.¹ A specimen of the Chrysomeline, *Diabrotica 12-punctata*, a very conspicuous beetle, black with yellow bands, was accepted by a Blue Jay (*Cyanocitta cristata*), whereas a sombre-coloured Carabid, *Scarites subterraneus*, was rejected!

In extenuation of the inadequacy of the present paper I would mention the very small amount of material that I have been able to examine, and the paucity of the literature to which I have had access. However, I hope that the paper will be of some small assistance to those who, stranded in the 'wilds' of Africa, may desire to take up the study of this fascinating group of beetles.

Those who in studying Coleoptera find delight and solace are well entitled to echo the words :—

'O wunderschön ist Gottes Erde
Und wert, darauf vergnügt zu sein.'

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¹ *Proc. Acad. Nat. Sci. Philadelphia*, Vol. LXIV, pt. ii, p. 281 et seq.

NOTES ON CERTAIN COLOUR PATTERNS IN
LYCÆNIDÆ

BY V. G. L. VAN SOMEREN

There has always been a certain amount of speculation as to the use or otherwise of certain colours and the distribution of them in Lepidoptera, particularly in Rhopalocera.

So-called 'mimicry' has its staunch supporters, and there appear to be considerable grounds for the various theories put forward. Little, however, in comparison, has been written regarding the peculiar shape of certain species of Rhopalocera, and this is a subject worthy of attention.

Certain lepidopterists have drawn attention to the curious shape of the anal angle in the wings of certain *Lycænidae*, and have put forward ingenious theories as to the uses of such peculiar formation and appendages, combined with the brilliant spots of colour usually associated with them. I propose in these notes to record my observations on this particular subject.

One authority has advanced the theory that the brilliantly coloured, rounded appendages, in conjunction with the so-called tails, are in reality 'false heads,' with the attendant eyes and antennæ, and, by virtue of their shape and colour, are a means of protecting the life of the insect against such natural enemies as lizards.

This theory is very pretty and attractive, but assumes a fairly high special development on the part of the insect, and a low intelligence on the part of the lizard. To my mind a compromise appears to offer the more reasonable explanation.

These appendages, coloured as they are, certainly are to the human eye objects of attraction; and, assuming that they appeal to the lizard in the same way, may be termed 'spots or areas of primary attraction.' I refer in the first instance to the markings on the underside.

A glance at the accompanying plate will at once show that all these insects have been attacked, in some cases more than once, in the same area, namely, the rear.

We can explain this in three ways—first, by applying the



theory of the false head, and assuming that the lizard, keen on capturing its prey, attacked the apparently most vital spot, namely, the false head ; or, secondly, by the compromise theory of areas of most attractability ; or, thirdly and most likely, by ascribing to the lizard a certain and by no means unlikely amount of intelligence, and saying that the lizard attacked the insect in its ' blind ' area, namely, the rear.

This last explanation appears simple and the most likely, until we come to study the actual specimens attacked.

It was my good fortune in July 1920 to find a small flowering shrub growing against a pergola constructed of rough branches, the former being most attractive to the ' Blues ' figured, and the latter the home of numerous wall lizards.

My attention was first drawn to this bush by noting that the butterflies were never still for any length of time, although feeding and sunning themselves ; this behaviour being quite unusual, in my experience, in the species under consideration.

This strange action led me to investigate the cause, which proved to be the repeated attacks on the part of the lizards.

Having heard of the theories mentioned at the beginning of these notes, I determined to try to prove or disprove them by personal observation. I accordingly spent several hours at the bush, and paid particular attention to the position of the attackers and the butterflies attacked. Every attack was made from behind, and on *no occasion* was a butterfly taken from any position other than the rear.

Now, studying the plate, it will be seen that all those in column B have the excised portion in the same area, and symmetrical in both wings, indicating that the wings were closed, and further, in No. 1, that the attacker was below and behind ; while in No. 7 a double attack has been made—the first from directly behind, and the other from above and behind.

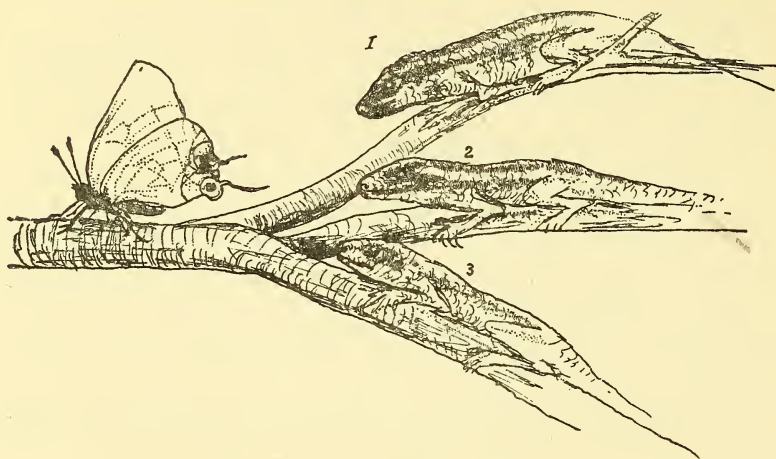
In some cases both eye-spots have been removed, in others only one.

In column C the excision has not been symmetrical in both wings, indicating that the wings were not tightly closed but slightly opened, and further, we can see the side of attack

well exemplified : in Nos. 1 and 2 the attack has been made from behind and on the right ; in Nos. 3, 4, and 5, from the left and behind, each victim having suffered from more than one attack.

In making the sudden dart, the lizard twisted his head to one side. It was only when the grip included part of the body that the catch was successful.

Another contributory factor determining the position and



SKETCH SHOWING RELATIVE POSITION OF EXCISED AREAS ACCORDING TO POSITION OF ATTACKER.

1. Attacker above and behind removes upper eye-spot and tail.
2. Attacker directly behind removes a portion of both eye-spots.
3. Attacker below and behind removes under eye-spot and tail.

shape of the excised portion is the habit which some of these species have of rolling the hind wings—that is, moving them up and down in a vertical position when still closed. In the specimens taken, the excised areas are the same shape but not in the same position on both wings.

Although on several occasions the tip of the fore wing was the nearest point to the lizard, no attempt was made to secure the victim. This would, then, appear to argue against haphazard attack, and lend support to the theory of selective position ; and so we come again to the point from which we started.

I would now mention that on a few occasions one wing only was attacked, and this at times when the butterfly had its wings fairly widely open, thus hiding from view the eye-spots on the underside, but incidentally laying open to view the very much more vivid colouring on the upper side of the anal angle, which was less like a 'head with eyes,' lending support to the theory of attraction by virtue of colour, not shape, or to the simple explanation that attack from behind is safer and more often successful.

Brilliant splashes of colour on insects and other creatures have sometimes been interpreted as being of use as danger signals or warnings, but such cannot be the case in this instance, as no warning is apparently heeded by the lizards—rather the contrary.

SOME NOTES ON THE WASANYE

BY ARTHUR M. CHAMPION

This hunting tribe cannot be said to inhabit any particular area, but may be met with from Kipini to Gazi, from Takaungu to Voi. I recently had an opportunity of visiting a settlement of these people some thirty miles west of Mangea Hill. The place was called Mlango Moro, but there is, I am informed, another settlement a day's march farther west, called Mtanyango. The tribe call themselves 'Wat,' but are spoken of by the Wanyika as the Alangulo. The local Elder at Mlango Moro is called Kalime Dida, but the settlement seem to regard one Dede who lives at Warumbe Forfa (about an hour and a half S.E. of Shakahola) as their chief.

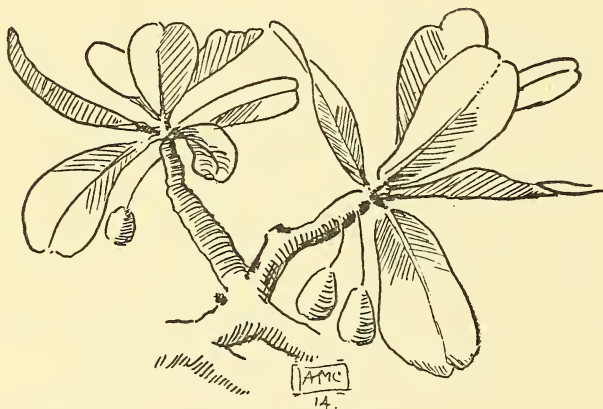
I found two villages, one of which had seven circular huts, and the total population of the settlement may have been twenty-five all told. One hut was much bigger than any of the others, being 15 feet in diameter, and, I should judge, 10 or 12 feet in height. It was finished off at the top very neatly in the form of a little ornamental point. Others were very roughly put together. I measured one of what I considered average size: it measured 9 feet in diameter and 5 feet in

height. One was, therefore, forced to remain in a crouching position when inside. There is no centre pole or any other



SANYA HUT.

support. Saplings are put into the ground in a circle, and bent inwards till they meet in the centre, where they are tied together. Horizontal saplings are then bound on to these



A TWIG OF "MNAGO," FRUIT NAGO.

from top to bottom. On top of this grass is thrown; only in the case of this one big hut have I ever seen any attempt at thatching.

The shape of the hut is that of an inverted pudding basin. The door is 2 feet wide and 2 feet 6 inches in height. It is

closed by a grass screen. In every hut I found the grass which the occupant used as a bed on the left, and the fire on the right. This settlement had some shambas, and some had built small stoves in *Giryama* fashion, which were placed on posts over the fire. The doors of the huts all faced roughly east.

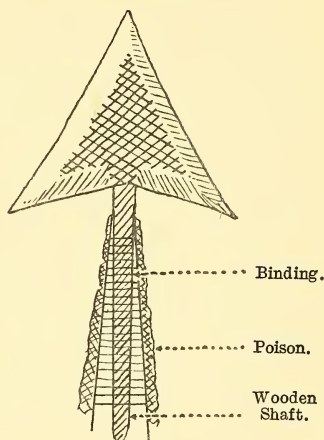
The inhabitants had, unfortunately, gone on a hunting expedition to a place called *Ariba Kitengo*. Their grain was all finished, and want of food had driven them in search also of the berries of the *Mnago* tree. This is a tree of medium size, with small rich green leaves growing at the end of each twig in a bunch. The fruit is yellow when ripe, and contains a white juice. Personally I found it very unpalatable, but I am assured that the *Alangulo* like the fruit so much that they strip a tree at once when found.

A bow was measured and found to be 5 feet 6 inches in length, and the accompanying arrows 2 feet 11 inches in length. They were poisoned, and fitted with an iron head of a type known amongst both *Alangulo* and *Giryama* as 'Tali.' The head and poison, which extended five inches up the shaft, was wrapped up in a strip of thin hide. The feathers used were very stiff, and were probably those of a vulture. The feathered end of the shaft was dyed red.

The *Tali* head is very thick and strong, and is used for shooting big game, including elephant.

The poison is a thick black substance of the consistency of treacle, and made from a tree called *Mutsungu* by the *Giryama*, and *Hadda* by the *Alangulo*.

The branches are cut into pieces about a foot in length, and afterwards again cut up into smaller pieces, bound together, and boiled in water for a day. Some wood of the *Madiga* tree is also added. A rat called *Pinji* is also put into the



"TALI" ARROW, ACTUAL SIZE.

mixture, as it is believed that the wounded animal will not then be able to cross a path without falling dead.

Some black substance found in the liver of a crocodile is finally added, as it is believed that by this means the wounded animal will at once fall dead if he should stop to drink water by the way.

A mysterious hidden force seems to be recognised, and is called 'Wak,' the same word being used by the Galla and the Duruma. The word is not used by the Giriyama, who use 'Mulungu'; Mulunguni denoting the heavens.

The pottery found was all in the Giriyama style. A honey barrel, which was beautifully fashioned, was found to be without mark of ownership. A small wooden drum with bottom and cover made of skin is a universal receptacle of the Alangulo for all kinds of food, and is carried by means of a strip of hide passing over the forehead. These are similar in appearance to the Kithembi of the Akamba.

The crops in the neighbourhood looked at least as flourishing as those of the Agiryama.

The Alangulo in the neighbourhood of Mlango Moro, where I camped, seemed very shy, and those whom I met invariably fled into the bush. It is hoped next time, through the medium of some friendly Giriyama, to establish better relations, and obtain some more information about these interesting people.

REPORT ON THE BAJUN ISLANDS

BY J. T. JUXON BARTON

I. PEOPLE

The Bajun (Ar. *Ba-gun*, a white tribe), Wa-Gunya (Ki-Swahili, Ku-Gawanya, to divide), *i.e.*, a fractious people, a term of reproach applied by the Southern Wa-Swahili to the Northern and by the Northern to the Southern, or Wa-Tikuu (Ki-Swahili, contracted from *nt'i kuu*, the mainland), are said to represent the oldest form of civilisation on the coast; their language, the most archaic form of Swahili.

They inhabit the islands on the east coast of Africa lying between Lamu and Kismayu. These islands are divided into two groups, the northern group being known as the Dundas Islands.

It is submitted that the inhabitants of the northern islands are of a different origin from those of the south.

Their origin has been variously stated as Phœnician, Himyaritic, and Hamitic. The fact that coast dwellers of all nations can hardly claim descent from one stock seems to have been lost sight of, and an unreasonable antiquity argued from the ruins on the islands and on the mainland opposite to the islands.

Sir Harry H. Johnston, K.C.B., stated that at about the same time as the Bantu race movement, some 3000 years ago, the Arab-Sabæans came voyaging down the east coast of Africa, until they ultimately settled in the Sofala district south of the Zambesi, leaving as witnesses of their venture the Zimbabwe and other ruins. Phœnicians also explored the east coast, founding stations as far south as Mozambique: one expedition, in the employ of the Egyptian King Necho, is said to have circumnavigated Africa about 600 B.C.

Later the pre-Islamic settlements of Arabs from Southern Arabia were revived by militant traders and missionaries of Islam establishing themselves at Mozambique, Kilwa, Zanzibar, Mombasa, and various ports on the Somali coast.

A colony of Mohammedan Persians (Shirazi) joined them in the tenth century at Lamu, and Persian as well as Arab influence began to be apparent in the architecture on the east coast.

Until the settlement of the coast towns by the Portuguese in the sixteenth century, these Arab states were sparsely colonised by Himyaritic or South Arabian Arabs from the Hadramaut, Yemen, and Aden.

A development amongst the Arabs of Muscat drove the Portuguese from that territory, and, following up their success at home, these Arabs attacked them on the east coast of Africa, the Muscat Arab becoming the predominant type.

In this connection may perhaps be mentioned the traditional arrival of two hundred and fifty Portuguese at Tula Island,

with an equal number of women who were, so the tradition runs, driven out of Arabia by the Arabs. A Portuguese grave is to be seen to this day on Tula Island.

Though immaterial, the higher type of features so noticeable amongst the population of Faza, Patte, and Siu in the Lamu Archipelago, is stated by the Bajuns to indicate European blood; and in further support of this opinion, the Bajuns of Tula amusingly instance the Faza custom of hanging washing to dry on a line, and taking the clothing down with a tearing motion, instead of laying on the beach with stones as weights, and carefully folding in the native fashion.

A rough chronology of the coast would seem to be :

- B.C. 600. Pharaoh Necho of Egypt sends a Phœnician expedition, which is said to have circumnavigated Africa in three years.
- A.D. 720. First Islamic settlement.
- 1497. Vasco da Gama rounds the Cape and visits the towns on the coast.
- 1584. Portugal is in possession and defeats Turkey, who attempts to wrest from her the Zanzibar coast.
- 1698. By this date the rising of Arab power of 'Oman has driven Portugal out of all her possessions north of Mozambique.
- 1752. The Portuguese, having finally lost Mombasa in 1730, recognised the Muscat Imamate of the coast.
- 1888. The Imperial British East Africa Company receive a charter.
- 1894. The I.B.E.A. Company is withdrawn, the territory becoming a protectorate.

The maps of Africa, according to Herodotus, 450 B.C., and Eratosthenes, 200 B.C., do not extend south below what is now Cape Guardafui.

'The Periplus of the Erythrean Sea,' *circa* A.D. 80, is a navigation guide of the east coast of Africa to about the latitude of Zanzibar.

Ptolemy, in about A.D. 140, marks the coast of Jubaland and Italian Somaliland as simply 'Barbaria,' the interior as

'Azania,' Kismayu 'Parvum Littus,' Port Durnford or thereabouts 'Magnum Littus.' Al Idris, in 1154, follows Ptolemy in 'Barbaria,' marking islands off the coast.

Martin Behaim, in 1492, leaves the coast a blank.

Diego Ribero of Seville, in 1529, showing Lamu, Patte, the Bajun Islands, the mouth of Juba River almost accurately, embellishes the coast and interior with drawings of elephants.

Pigafetta, in 1591, shows what may be the Tana River, Barkao, the mouth of the Juba, and islands.

Jacob van Meurs, in 1668, shows a town at Kismayu called 'Liongo,' and marks the vicinity of the Juba River 'Barenboa,' calling an island, with a town on the mainland opposite, 'Tetile' (Tula).

H. Moll, in 1710, calls the coast of Jubaland 'Barra Boa,' and the interior 'Quilimia.'

Smith's New Map of Africa, 1815, shows a town on the Juba mouth and the country between the Juba and the Tana as 'Galla.'

'Liongo' was a semi-mythical Swahili hero, vulnerable only in his navel to a copper needle, the subject of many poems, who lived in the neighbourhood of Lamu and who was buried at Ozi. Lamu and Patte are, however, shown in Jacob van Meurs' map, while Liongo occupies the place of Kismayu.

'Barenboa,' 'Barra Boa': the Bajuns, the Gallas, and the Somali use the word 'Barobaro' to denote an unmarried youth of the warrior class. Possibly also the word may be derived from 'barra' (Ki-Swahili, Arabic, 'the interior').

'Quilimia' (Ki-Swahili, Kilimia, 'the Pleiades').

In attempting to deduce an origin of these people, the Himyaritic element pervades the coast; to a lesser, much lesser, degree the Persian; the Portuguese, with the early crusading zeal of Roman Catholicism, are little likely to have mixed their blood, on pain of purgatory.

The Persian element persists in a lesser degree, in that this tenth-century settlement of Shirasi adventurers would seem to have definitely limited itself to Lamu, where the prevailing type to this day is in marked distinction from the Bajuns, and it is to be remembered that until, and after, the arrival of the English, internecine war was rife.

There remains, then, what may perhaps be called the Hamitic theory. This seems to have received little consideration, despite the traditions of the Bajuns, and despite the obviously Hamitic features of many of the islanders.

In brief, the Bajun tradition is that they came from the north-east and occupied the present Garreh country, north of Dolo ; were driven south-east by the Galla invasion ; settled at Afmadu ; were driven by the Galla to the coast at Kismayu, and thence to seek refuge in the islands.

They claim to have dug the so-called wells at Afmadu, and to have possessed camels.

A further point in estimating their origin which does not seem to have been mentioned is that the Bantu Nyika (Ki-Swahili, ' desert ') tribes (Digo, Duruma, Rabai, Ribe, Kambe, Jibana, Chonyi, Kauma, and Giryama) occupied the Shungwaya or Burkao (Port Durnford) country, and were driven south by the Gallas. These people now occupy the littoral from the Tana River to the, until recently, Anglo-German boundary. The Bantu dialect spoken is akin to Ki-ngozi or Ki-ngovi, the old language upon which modern Ki-Swahili is based.

The Persian and Portuguese elements seem justly negligible. There then remain the Southern Arabian, the Hamite, and the Bantu as progenitors.

(1) *The Arab*.—The Arab, driven by trade, pestilence, or famine, left his country and established stations along the coast. Were pestilence the reason, the disease would have followed ; were famine, he would not have chosen the arid coral rag of the islands, open to the winds, with an inhospitable mainland, to give him sustenance. The factor was probably trade ; and gold mines were worked near the Zambesi early in the history of man. Moreover, harbours near to food centres were necessary, and he chose Lamu and Mombasa as his home.

(2) *The Hamite*.—The Bajun claims what almost may be called ' Somali ' descent. He was driven from Garreh to Afmadu, from Afmadu to Kismayu, and from Kismayu to the islands by the Galla, and the Galla occupied Jubaland until fifty years ago.

He states he dug the wells at Afmadu : these wells are almost horizontal caves, not the work of Arab craftsmen.

He did not build with stone at Garreh, nor at Afmadu, nor Kismayu ; but on the islands he built with stone in the Saracenic style—and work in stone is not learned in ten generations, and now the Arab element has disappeared he no longer uses stone.

The ruins on the islands have been stated to be of great age : all the evidence would seem to be to the contrary. The style is Saracenic, which style gave to Europe the battlements and portcullis of the medieval castle, and this style has undergone few if any modifications since its inception. The material used was coral rag and lime, and one has not to go far afield to see the result of but a year's neglect on such buildings on less exposed sites.

The people of Burkao (Port Durnford) claim kinship with the Rendile, and state that when accompanying the late Mr. Reddie, then District Officer, Port Durnford, on his journey to Rendile, they found lost relatives and brothers. The Rendile are of ' Somali ' origin.

Bwana Hamudi, late Headman at Port Durnford, was of pure Garreh descent.

(3) *The Bantu*.—The place of origin of the Nyika tribe is the Jubaland littoral. Odd survivors owning stock as Somalis are still to be found, and, still more curiously, Bajuns (Tula Island) have spontaneously stated the former neighbourhood of the Wa-Nyika.

The Wa-Nyika were possibly agriculturists in the fertile watered valley between the Anole and Burkao creeks, now the Herti-Magharbul grazing. They were obviously hunters, nomads if necessary ; undoubtedly subject to slave raids, equally undoubtedly to Mohammedan concubinage ; and harassed from the coast by slavers, from the interior by the Galla, they sought refuge from their oppressors in comparatively recent times, and crossed the river Tana, as did the Galla in their turn when harried by the Somali. If this is, then, the parentage of the Bajun it is submitted that their story should run as follows :

The great migration of Hamites, increasingly obvious in the southern movement of the Somali tribes of the present day, began in the mother country of middle Egypt and Arabia.

One branch, the Gallas, reaching Abyssinia, passing, driving before it all weaker tribes, mingling with its captives, drove the so-called Bajun (nomads also) from well to well until a sure refuge was found on the islands. The coast and hinterland was occupied by the Nyika tribes, and with these the islanders mixed: the struggle with the Gallas still continued, the islander and the Bantu being attacked as the former tried to regain and the latter to retain his hold upon the mainland. And so the struggle continued until and after the coming of the Arab from the south. The Arab came as a trader in ivory and slaves, and by barter with the Galla and the help of the Bajun, secured both the ivory and the slaves.

Mixing with the Bajun and Bantu, he built houses and mosques¹ where no real prosperity promised (for the supply of ivory and humanity could not last, since both beast and man run from fear), and where but the scantiest crops could be grown, so that he brought grain from Lamu and the south in dhows. He was at his greatest prosperity in the eighteenth and early nineteenth century, when even the Galla, pressed by famine, sold his children, and so until the middle nineteenth century, when the Galla hunter disappeared into the dense Tana bush before the Somali coming by sea and land.

With the advent of government, the abolition of slavery and the preservation of ivory, the Arab returns south, leaving his houses, his mosques, and a people of mixed Hamitic, Bantu, and Arab blood using his buildings until the action of the winds and sea crumbled them away, and returning to their previous state of bare sustenance.

The Bajuns are light coloured, intelligent, and unwarlike. They are Mohammedans of a devout type, in marked contrast with the Pharisaical Somali. They are miserably poor, extremely thrifty, but spend lavishly when in funds. The average monthly earnings of the Bajun may perhaps reach seven rupees.

They have some knowledge of agriculture, and, what is

¹ A venerable and ruined mosque, now unused, on Koyama Island shows the date 1224 A.H. which, by use of the formula: $A.H. - 3 \frac{A.H.}{100} + 621 = A.D.$, gives the year 1808.

more important, the will to work : they obtain small crops from the most impossible soil.

They are courteous and obliging to strangers, and exceedingly friendly to government.

They possess a certain amount of low cunning, which is naturally more obvious in the markedly Hamitic type, but are otherwise honest in their dealings. They borrow extensively from Indian (Kismayu) traders, loans sometimes reaching Rs. 4000, which is evidence of their integrity or of an ivory trade, for they can give no security.

Their houses are built of wattle and daub, the palm for the roof coming from Lamu. Shelves and crude ornamental devices are sometimes contrived in the walls of the rooms. The houses are well-built. Bajuns are unable to build in stone, and probably they never knew the craft. The wells are all of some age.

The upanga is carried by the man, and is often ornamented with silver ; this sword is a cutlass, and different from the Arab weapon.

Their dances are the usual advancing lines of men and girls ; married women should not dance.

Two dances are performed exclusively by men, the one a sword-dance, the dancers prancing around one another, cutting at head and foot, a cloth being held in the free hand as a shield with sometimes another cloth in the teeth ; the other is the old English quarter-staff, save that damage is rarely done. To this, drums and brass trays are beaten. The former is the Hazua, the latter the Kirimbizi.

Women and girls have also dances, no man being present. This is the Msondo, or school of love, presided over by a Somo, an adept in the art of attraction, the pupil being called Mwari. The original purpose of the Msondo was undoubtedly to prepare girls for the housewife's duties, the present practice is best imagined. A polite custom of the islands dissuades a man returning at night from landing and entering his house.

The women possess long hair which they wear in a coif, the ears are pierced for Arab ear-rings, the lobes often distended for the introduction of coloured paper rolls ; the use of ornaments is lavish. Both sexes chew snuff mixed with

magadi (soda). Comely women are confined to their houses ; this is by no means general, and the shapeless blue buibui is not worn.

The threefold divorce is rarely used, the first formula being regarded as sufficient.

Fish is the staple diet : there are, however, clans who eat no fish. Most shell-fish, other than oysters, are prized ; both men and women string cowries for the Indian market. Corn is sold at 12 lb. (two pishis) for the rupee. Seaweed is eaten.

Buni (unhusked coffee) is as necessary a drug to the Bajun as to the Somali and Galla.

A few goats and cattle are to be found on the islands.

Fishing dhows are made of Msindi wood, which has the disadvantage of not rising to the surface after immersion, the planks being bound with fibre rope and rendered seaworthy with shark fat. Very few large dhows are to be seen, and these represent bad debts of Indian merchants in Kismayu. The coastal carrying trade will be in time entirely in Indian hands. Small white pennons are flown on the bowsprit to propitiate the elements. A person on his first voyage must tie some article of clothing to the mast until the journey's end, and redeem it at a price.

The boating songs are exceedingly tuneful, and would be worth collection.

The method of catching the turtle by the Koyama people is worth recording. The taza, a slender sucking fish, about two feet or so in length, is caught. When a shoal of turtles (kasa) is seen, this fish is thrown into the water attached to a line. The taza almost 'hunts' his enormous victim, fastens himself to the under portion of the throat, sucking its blood, and the turtle is drawn towards the boat, from which the fisherman dives to fasten an iron ring, with a rope attached, to the turtle's flapper. This mode of fishing would seem to be unique.

The Bajun is a dying race : with some help and fosterage from Government they might be saved : their economic value is undoubtedly greater than that of the Somali, and their loyalty is not in question.

II. THE ISLANDS

(1) *Koyama Island*.—This island is situated some $21\frac{1}{2}$ miles down the coast from Kismayu, its greatest length being $3\frac{1}{2}$ miles, its breadth 2 miles.

There are two villages on the island, the village on the shore being known as Koyama, the village on the hill a mile or so away, Koyamani. The inhabitants of this island are markedly Hamitic in features. They regard themselves as a distinct tribe, and seem the most feeble and dispirited of the islanders.

The island possesses about four mosques in varying states of repair; a venerable ruin gives the date A.H. 1224=A.D. 1808. Tombs of a more intricate design than those of other islands are to be seen on the foreshore. China plates are cemented into the mosque walls around the Kibla.

A cloth slightly different from that of Benadir is still made.

Coco-nuts, tobacco, and some grain is grown. The people possess a few sheep and goats. The turtle is esteemed as a delicacy and caught in a manner already described. The wells are extremely brackish.

Some fifty years ago, when Jubaland was in the possession of the Gallas (an old man states), two boats' crews, fifteen souls in all, from one of Her Majesty's ships arrived, the vessel having foundered. These survivors were fed by the inhabitants, giving written bills in exchange for meat and grain: they camped on the highest point and remained two months when a ship was sighted which rescued them. Their debts were paid in full, and the late Headman possessed a letter of commendation from a shipwrecked officer.

On one occasion Somali traders from the Benadir had put into Tula Island and captured four children: all the slavers were killed, and the Bajuns returned by the English.

Bajun tradition states that the islands were populated by a race crossing from the mainland at Koyama, each section cutting its mark on a baobab tree opposite the island. These marks are very like the cattle and other brands of known Hamites.

The life of the baobab may exceed a thousand years : the tree in question is of great age.

(2) *Ngumi Island*.—This island is close to Koyama, its greatest length being $4\frac{1}{2}$ miles and breadth 1 mile. It is uninhabited save by two or three fishermen. Water is obtained from Koyama. The island possesses considerable ruins of a walled-in village. It is of no interest save with reference to the legend associated with the mosque.

The inhabitants traded in ivory and slaves with a white race : the tusks were packed in the long matting-bags used for grain. On one occasion a cargo was taken, but the bags contained but one tusk each and were packed with camel and other bones. The traders sailed, and on their return bombarded the village, destroying all the inhabitants.

One woman ran for sanctuary to the mosque, praying that she might be saved from the raiders ; her answer was her transformation into stone. The stone has now disappeared, but is stated to have stood near the Kibla : it has been reported as still existent, but its whereabouts kept secret. From this legend Astarte worship has been argued, somewhat unwarrantably.

Men desirous of children burn incense before the ruined shrine.

The Bajuns are unwilling to clean the old stone wells in that each well demands a life.

(3) *Chovai Island*.—Chovai is the correct Ki-Tikuu name for this island, which is called Towala by the Arabs. The island is the most populous of the Dundas group.

It possesses very few stone ruins. The existing mosques have been repaired recently.

Some attempt at agriculture is made on the mainland. Sheep and goats are grazed. The water is moderate.

The inhabitants seem the most wealthy of the islanders, are markedly Hamitic, and are divided amongst themselves.

Chovai creek on the mainland is a harbour for native craft ; the creek, penetrating some miles inland, is fringed with mangroves.

Ivory is probably smuggled.

(4) *Tula Island*.—This island is second in point of population: it is 57 miles from Kismayu, is $1\frac{1}{2}$ miles in breadth, $3\frac{1}{2}$ miles in length. The water is the sweetest on the islands.

There are two villages on this island, the one Tula, the other a mile or so distant, M'doa.

Coco-nuts grow extremely well, and with some encouragement would become profitable.

The island possesses a large tomb, said to be Portuguese, made with a cement the secret of which has been lost. The decorations are not Islamic.

Legend has it that five hundred Portuguese men and women landed on the island, having been driven out of Arabia: more probably they were expelled from Mombasa or Lamu by the Arabs in the eighteenth century.

A house, the interior decorations of which are singularly delicate, is shown as of great age. It was built with slave labour by the great-aunt of a living inhabitant. This woman was of the Defarad clan of the Tunni tribe and the Barawa people of the Benadir coast. The Tunni and Rehawen fought with the Somalis at Gumbo and were driven north.

The three stone mosques are in good repair: the interiors are decorated with plates: in many cases the design of this china is modern.

On the mainland a few hundred yards from the shore, at Kituni, is the ruin of a considerable mosque, the interior of which is decorated with the 114 Suras of the Koran carved in the plaster.

On the right-hand bank, at the mouth of the Anole Creek, are more ruins, likewise on the left-hand side at Kudai.

It is submitted that these mainland settlements were in their conception custom-houses, and, as relations with the Galla or Wa-Nyika were established, became villages. The custom is well known; the grain was placed some distance away, the tusk was brought: if either the price or the article did not suffice, the dissatisfied warned away the other by hostile demonstration. Manifestly the islander could not barter in safety on his island.

(5) *Kudai Village*.—This is a small settlement on the mouth of the Anole Creek, inhabited by a few Bajuns, who eke

out a wretched living by fishing and attempts to grow crops. It is marked 'Kituni' on the latest maps.

(6) *Anole Village*.—This is a small village of natives of various Bantu tribes who have moved from place to place until they have reached the head of Anole Creek, some twenty-five to thirty miles from the sea.

Their condition is miserable, and they are in constant dread of raids by Rer Abdulla youths aspiring to the white feather.

The soil round this village is suitable for shambas on an extensive scale ; corn, sim-sim, manico (*muhogo*), and tobacco are grown.

The neighbourhood is the Jilal grazing of the Herti and Magharbul Somalis, with whom their relations are friendly. The water, from shallow wells, is abundant, clear, and sweet.

This stretch of fertile country extends for a considerable distance, as far as Busbushli on the Burkao Creek.

A road is said to have been cut by Mr. Haywood, District Commissioner, from the head of Anole Creek to Kudai. It is not visible, and the camel track followed through thick bush is a nine to ten hours' march. (European.)

(7) *Tosha Village*.—This is a small and insignificant village some two miles from Kudai on the mainland. The water is moderately good.

(8) *Sheh Village*.—This village, some five miles south of Tosha on the mainland, has been abandoned. No water is to be found, and mosquitoes with sand-flies in the mangroves render camping impossible.

(9) *Port Durnford Village*.—This is marked as Burkao on maps ; it is called 'Birikavo' by the Bajuns.

Formerly a Government station was maintained, and a considerable village was built, trade being with the Abdulla and Magharbul Somalis. It has since been abandoned.

There are ruins of an old village at Port Durnford and of a pier.

The water is impossible even for native consumption, and for Europeans the rain-tanks must be supplemented with water brought in dhows from Busbushli, some twenty miles up the creek.

The harbour is suitable for large vessels ; boats drawing four to five feet can enter the creek some nineteen miles, which is navigable a further sixteen miles, as far as Wayore, by craft drawing nine inches or so.

Busbushli, where a large supply of fresh water is to be found, is the grazing of the Rer Abdulla section of the Ogaden Somalis during the month of January.

The Mohamed Zubeir Ogadens claim a vague suzerainty over this section.

Busbushli would seem a natural basis for operations against the Rer Abdulla.

The Administration house at Port Durnford is a large and commodious building, erected by the late Mr. Reddie, when District Officer.

It is now sadly in need of repair in every particular. The roof beams have fallen in some places, the windows and doors are broken, the floor has cracked, the verandah is a mass of rubble. The house has been in the occupation of a Police Post.

The inhabitants of Port Durnford wish to move to Ras Mnarani, some six hours distant down the coast, owing to the suitability of that place for shambas, water and grazing, and the impossibility of the water at Port Durnford.

(10) *Ras Mnarani*.—This can scarcely be called a village as yet. The inhabitants of Port Durnford, however, are desirous of moving thither, where water, grazing and some cultivation is possible.

Ras Mnarani is six hours' march from Port Durnford.

III. THE COAST

The coast-line of Jubaland from the river Juba to Ras Kiambone is about 120 miles long, a practically continuous line of sand-hills.

There are three tidal creeks—Chovai, Anole, and Burkao.

The creeks are fringed with mangroves, mwea, mkandaa and mutu trees, all of some commercial value :—

(1) *Chovai Creek*.—This creek lies opposite to Chovai Island, and is suitable for coasting craft.

(2) *Anole Creek*.—This creek is suitable for boats drawing three to four feet for about five miles. Canoes and small fishing-boats can be punted or sailed for this distance, and can proceed a further twenty to twenty-five miles in the dry season.

The journey to Anole village at the head of the creek should not be attempted by Europeans by land or water in one day.

(3) *Burkao Creek*.—Port Durnford, a sub-port, is a sheltered anchorage of about six fathoms. A steamboat has ascended the creek for about twenty miles in the dry season to Busbushli. Dhows drawing four to five feet can reach Busbushli at any time, and canoes, Wayore, a further sixteen miles.

The rumours of tsetse-fly would seem to be an obstructive Somali (Herti) myth.

This tribe grazes its cattle along the coast-line to Port Durnford, and what is more, along the Chovai and Anole creeks, the rank vegetation of which should harbour all manner of insects.

IV. COMMUNICATIONS

(1) *By Sea*.—Journeys by sea are naturally subject to the N.E. and S.E. monsoons. The former blows roughly from April to August, the latter from September to March. During both monsoons the current is stronger near the land; despite this, the more speedy mode of travel against the monsoon would seem to be poling along the shore. The time taken between island and island is a matter of circumstance.

(2) *By Land*.—The owners of boats on each island take it in turn to keep a ten days' watch. A fire is lit on the mainland, and travellers are ferried across to the island, where water can be obtained.

Chovai Creek has no ferry.

V. TRADE, PRODUCTS, ETC.

The Bajuns would seem to do a great deal of the coastal carrying trade. In reality this business is rapidly becoming a purely Indian concern.

Fishing is engaged in mainly as a means of livelihood.

Cowries and dried sharks' flesh are bought by Kismayu traders.

Pearling might become profitable, but the Bajuns do not possess the power of deep diving.

Coarse 'càrriage' sponges are to be found.

Ambergris and turtle shell are rarities.

The question of grain for food deserves special consideration. The Juba river strip is in the hands of Arabs financed by Indians: the Bajuns on the islands consequently starve.

The coral rag of the islands is not fit for agriculture: an attempt is made to grow crops on the mainland a few yards from the shore: this is but little better.

The only arable land adjoining would seem to be the almost well-watered valley or 'tug' stretching from Mtoni at the head of Anole Creek to Busbushli, twenty miles up the Birikou Creek. The Chore or Joreh country is also watered.

Coco-nuts grow well on Tula Island, and would do well at Kudai and Port Durnford.

Trees of commercial value are to be found at Chovai, Anole, and Birikou creeks. These are 'borities'; 'mweah,' small borities used in the construction of native huts; 'mkandieh,' a wood used for burning lime; 'mutu,' a tree used for making native beds, chairs, etc., and burning lime.

Wild rubber is to be found in the vicinity of Port Durnford.

NOTES ON EAST AFRICAN MAMMALIA (OTHER THAN HORNED UNGULATES) COLLECTED OR KEPT IN CAPTIVITY 1915-1919. PART II.

BY ARTHUR LOVERIDGE

One day I tossed the still warm body of a newly-killed rat to her to see what she would do. First seizing the tail in her mouth she defied anyone to take it from her, then she subjected it to a critical examination, opening the mouth and looking inside, licked the blood from its nose, examined its fur minutely

and appeared to capture and eat some fleas which she found there. After this she climbed to her box upon which she sat, and placing the rat between her knees nursed it in a most comical way. She clung to this rat for two days, defeating every effort to deprive her of it; by the end of this time all the fur was off, the carcass was positively green and liquid, and as she held it in her mouth the flies buzzed all about her.

On the third day she gnawed through the telephone wire with which she was attached to her pole, and escaped. I recaptured her the same afternoon and fixed her with a light chain; after several attempts on this, she settled down and became very docile and affectionate. Alas! Two months later she died. One morning there were signs that she had had a bad attack of diarrhœa during the night; in the morning she was lying on her side toying with bits of gravel. I immediately let her loose and she took a little milk and sugar, she then went to the wash-basin in which she stood her fore paws and drank deeply. I lifted her on to the bed and she bit me. I made her comfortable but she arose and went to the other monkey, throwing herself down beside him in a very exhausted manner. *C. rufilatus* showed its sympathy by trying to clean Jenny's fur.

At 7 A.M. she went towards the bush where my boy found her about 9 A.M. and brought her back, whereupon she bit him. One would have supposed by her appearance that she was too sick to walk, but at 2 P.M. she went off again and hoping she might find something in the way of medicine for herself I said she was to be left alone. At 4 P.M. she walked into camp very slowly and on reaching the first hut she fell down in the shade in the most abandoned manner. Salimu brought her up and laid her on the bed looking most humanly forlorn. Almost immediately, however, she sprang up, clambered up a strand of wire with agility, hurried across the top of the python's cage, descended the wire netting on the further side and ascended to her own box. All this was done with such agility that I remarked to the boy that I feared she was not so ill as she looked, but native-like was making the most of it.

How grossly I had misjudged her was revealed next

morning, when her dead body was found in the mouth of a drain or waterway which led from the python's cage. Whether she had gone there seeking water, or had crept in with the idea of hiding away, it would be impossible to say.

Colobus abyssinicus caudatus, Thos.—A troop of the beautiful White-tailed Guerezas were seen in the West Kenia Forest, where they went springing and swinging through the tree tops; their arched tails with long hanging fur looked very fine. Professor Gregory, in his work 'The Great Rift Valley,' says that far from making them conspicuous, as one might suppose, the long hanging fur has the effect of making them appear like one of the great tufts of lichen (*Usnea*) with which the trees are draped. The only specimen the writer has seen in captivity was captured in a village near Kabete. When I saw it six weeks later the children who had made a pet of it had made it so tame that it would feed from the hand. This animal was very old; young ones have a little thumb which disappears with advancing years.

Papio ibeanus, Thos.—No baboons were ever collected. In the Forest Reserve at Nairobi they were very plentiful. They were very noisy animals, uttering a deep bass semi-bark which has, I believe, been likened to 'chaoma.' If one remains quiet in the forest, they come within about fifty yards and look down from amongst the foliage; as soon as one stirs, away they go crashing from tree to tree, setting all the branches swaying. One morning my attention was drawn to a party of them on the Limoru road, near 3rd Avenue. Though it was only 8.30 A.M., there was a fair amount of traffic passing along the road. These baboons had come from the forest and were rooting about among the huts of a temporary P.W.D. road-makers' camp. The natives were all away at work, the grass huts were deserted, so the baboons had it all to themselves. One old fellow seemed very busy stuffing handfuls of something into his mouth. Keeping a galvanised-iron shed between us, I walked quietly across to him so that he did not see me until I was within twenty feet. He then looked up, gave a bark, and cantered away like a great dog. He only retired a short way, then swung himself up into a very small tree, where

he joined two others that had escaped my notice. The rest of the troop acted in a similar way instead of making off into the forest.

When making camp one stormy evening in the Kedong Valley we heard the familiar bark, and looking up saw one great brute silhouetted against the sky; he was sitting on a large boulder on the very brink of a two-hundred-foot precipice.

At Longido West we were called upon to stand to arms at 2 a.m. one morning (24/11/16), as shots had been heard up the mountain. In the morning it transpired that a troop of baboons, stealing down to the water to drink, had been mistaken for German askaris by the Indian picket; the latter had fired upon the animals, killing two.

Trekking between Arusha and Moshi, in dry, rock-strewn kopje country, several parties of baboons were seen overturning stones in search of insects which they like. At Kongwa, parties of them raided the mealies in broad daylight. Sentries posted in prominent places kept a good look-out and gave warning of the approach of anyone with a gun. It was intensely amusing (except to the owner of the mealies, I suppose) to watch them making off when thus disturbed. Big and little ones, with an armful of mealies and a mealie or two in their mouths, would lope away on three limbs, and in a few instances on two limbs, having the arms occupied with the mealies.

At Dodoma they lived on the kopjes; on the lower slopes of the Uluguru they might be found any evening, generally rooting about in the natives' shambas or among the open bush in the ravines. The largest party ever seen was crossing a plain at West Kenia; there must have been nearly two hundred of them, and many of the mothers were carrying young ones on their backs.

Small Grey Lemur.—When at Msiha River (Shell Camp), I heard that one of the men in the Calcutta Volunteers had a tame lemur. I called to see it. The little creature was not more than eighteen inches from tip of nose to end of tail. This prisoner of war was chained to a sapling with a little belt around its woolly waist. It had the distinction of living on army rations, and one of its principal stunts was to get

inside empty two-lb. jam tins, which one would have thought impossible. Once inside it would revolve slowly round and round until the tin was as bright as the day it left the factory. It would then bolt for its tree, and mounting to the topmost branches sit down at leisure to lick the jam off its fur.

Galago hindei, Elliot.—The lemurs, known to the Swahili as komba, are to be heard crying in the trees at Frere Town, Mombasa, almost nightly. Probably they live royally upon the prolific mango crop. They are captured at times by the natives in the following manner. Pombe (native beer) is placed in the trees in the half of a coconut-shell; the lemurs are fond of this and drink until intoxicated. If the tree is visited early the following morning, the creature is found in a fuddled condition and falls an easy prey, for its judgment in making the prodigious leaps by which it would normally escape fails under these circumstances, and the creature, if it attempts to jump at all, falls to the ground. A single specimen was obtained some seven miles from Frere Town, where it was found sleeping in thick bush about fifteen feet from the ground.

Galago panganiensis, Matsch.—For notes on this species, both in the wild state and captivity, see JOURNAL, No. 16.

PTEROPODIDÆ

Epomophorus crypturus, Peters.—This Fruit Bat was met with at Lumbo, Mozambique, where five specimens were shot one afternoon, hanging singly, not in colonies, in mango trees. They were all females, each containing a single fœtus. Another shot at the end of September (30/9/18) had a much more developed one. The largest of these bats was $5\frac{3}{8}$ inches in length, with a wing-spread of 2 feet less half an inch. Female, 143, 0, 20, 25, 596.

Epomophorus minor, Dobs.—This species was plentiful at Tabora, Morogoro, and Dar-es-Salaam. At the former place they were found in a mango plantation; at Morogoro hanging in the palms which border the roads, and also in the acacia trees; at Dar-es-Salaam hundreds of them occupied an old Arab building which was in ruins. It was a wonderful sight

to see these bats hanging by their feet along the mid-ribs of the coconut-palm fronds at Morogoro. In January thirty-eight were counted on a single frond, twelve on another, and many of the other trees were loaded in a similar way. Two years later with two shots I procured twenty-one specimens. In July these creatures seem to go elsewhere, and not one was to be seen; they had not been molested at all prior to this.

These bats have little white shoulder-tufts when mature; by a curious in-turning of the skin they can conceal them from view. The largest specimens taken were from Morogoro, where two females had a body-length of $5\frac{1}{2}$ inches and a wing-spread of 23 inches. Female, 140, 0, 16, 19, 584.

Epomophorus wahlbergi, Sund.—Common at Nairobi and Dar-es-Salaam. At the latter place great numbers of them assembled in the mango trees, and their cries could be heard in the palace grounds all night long. It was by far the largest of the three species obtained, and also the handsomest, the fur being less brown and more mustard-coloured: there was considerable individual variation, however. The largest specimen was a male from Dar-es-Salaam, measuring $6\frac{3}{8}$ inches in body and $24\frac{3}{4}$ inches in wing-spread. Male, 160, 0, 22, 25, 290–630. Like *E. minor*, many specimens were infected with a small red acarine (?) parasite on the borders of the wing membranes.

EMBALLONURIDÆ

Taphozous mauritanus, Geoff.—Found on the trunks of mango trees at Morogoro and on the coconut palms at Dar-es-Salaam. The first specimen was seen on 13/1/17, whilst walking up the long road to Government House, Morogoro. In the native town this road is bordered with shady and generally very dusty mango trees, upon the bark of one of which I noticed something white. Upon closer inspection this proved to be a bat performing its toilet. The colouring of the back fur was fox-grey. The underparts were pure white, and the membranes of the wings so transparent that it had the appearance of a small tern when on the wing

in daylight—this illusion was no doubt largely due to the manner of its flight.

A closer examination of the other trees proved the bat to be quite common; a pair would be generally found together clinging upside down to the trunk. As soon as they realise that they have been observed they scramble round the bole of the tree with the agility of a gecko—they almost appear to glide. It is due to their alertness in this respect that I have not discovered them before, though frequently passing along the same road. The only occasion on which they were found in a different situation was when a single pair were seen under the eaves on a rough-cast wall; in this instance they travelled along the wall and round the corner of the house with the same quick movements as they display on the tree trunks. The largest specimen was a female from Morogoro, $3\frac{1}{2}$ inches in length, head and body only, and a wing measurement of $16\frac{5}{8}$ inches. Female, 90, 23, 32, 22, 422.

NYCTERIDÆ

Nycteris æthiopica luteola, Thos.—A specimen of this bat was smoked out of a drain running beneath a pathway at Frere Town.

Nycteris revouili, Robin.—Met with at Morogoro and Mpapua. In the former locality three specimens were captured in an ant-bear hole after digging down for five feet and along for perhaps six. This hole was out on the plain, and the find was interesting as it showed where these creatures put up during the day. The Mpapua specimen was found in a dark room in a house where there were some hundreds of bats.

There were patches of a red acarine (?) parasite behind the ears of one of the Morogoro specimens and on the wing of a female close to the body. In this specimen there were two holes in the wing-membrane, close to the parasites, which may have been caused by the host endeavouring with its claws to allay irritation. The largest specimen was a male measuring $2\frac{3}{4}$ inches in length and $14\frac{3}{4}$ inches across the wings. Male, 70, 56, 12, 32, 175–376.

MEGADERMIDÆ

Lavia frons, Geoff.—At Morogoro and Dar-es-Salaam. In the former locality they were found hanging in pairs, rarely more, in bushes or thickets on the plain. When first seen they appeared to be bright foxy-red in colour, but this impression is false, for it is only the huge ears and wings that are of this hue; the body is clothed with long, soft, blue-grey fur. They are expert in flitting about in dense thickets, and will not let one approach within ten feet of them. Towards evening they appear to leave the thicket and hang from some spray, exposing themselves to the last rays of the setting sun. At Dar-es-Salaam they hang in the bushes along the sea shore.

A male shot at Morogoro on 19/5/17 had five globular growths between skin and flesh on the breast and neck. These were about an eighth of an inch in diameter and came away readily, appearing to be a very thin-skinned sac containing aqueous matter. The largest specimen taken was a female, $2\frac{5}{8}$ inches long and $17\frac{3}{4}$ inches across the outspread wings. Female, 68, 0, 10, 45, 190–450.

RHINOLOPHIDÆ

Rhinolophus hildebrandti, Pet.—Taken at Mpapua and Kongwa in buildings. The pair from the latter locality were the larger, the female measured $2\frac{7}{8}$ inches in length and $16\frac{3}{4}$ inches across the wings. Female, 4, 42, 13, 29, 190–426.

HIPPOSIDERIDÆ

Hipposiderus caffer, Sundev.—A female was taken at Morogoro, 8/1/18. Length $21\frac{1}{8}$ inches, across wings $11\frac{1}{2}$ inches. Female, 54, 32, 7, 13, 131–292.

Hipposiderus ruber, Noack.—A couple of specimens of this bat were found bottled in a German house at Morogoro.

VESPERTILIONIDÆ

Pipistrellus nanus, Pet.—Some of these small black bats were brought me by a native collector. I think they were found in banana palms. The bodies were no larger

than that of a Death's Head Hawk Moth. The largest specimen was a female $1\frac{5}{8}$ inches long and $9\frac{3}{8}$ inches across the wings. Female, 41, 41, 5, 11, 108-238.

Scotophilus nigrita dingani, A. Sm.—Only one specimen of this yellowish bat was taken at Dar-es-Salaam, 11/18.

Scotophilus viridis, Peters.—A single specimen was taken at Morogoro on 15/9/17.

Eptesicus rendalli, Thos.—This species was occasionally seen flitting about in the gloaming at Lumbo. It was, however, far from common, and the only specimen obtained was brought me on 27/9/18. This was a male 2 inches in length, 52, 32, 6, 10, 24.

Glauconycteris argentata, Dobs.—This West African bat is considered somewhat rare, and was only met with at Morogoro, where it was certainly very local. They appeared to be confined to three roads—namely, Palm Street, Horne Street, and Station Road. The first time they were seen (16/1/17) I climbed upon a barrel and obtained five with one sweep of a butterfly net. A few months later (6/4/18) I made a close examination of the palm trees in the neighbourhood. On two trees were single female bats, and on a third were sixteen bats on a single palm frond: they cling to the 'leaves' near the mid-rib in groups, only two to four on each leaf; they do not hang clear with heads down, but cling to the leaf with their tails towards the mid-rib; the head of the one nearest the mid-rib rests upon the back of the next bat in front of him. Generally they were assembled upon the lowest branches at a height of 20-25 feet from the ground. By stopping a cart loaded with sacks of mealie and climbing upon it, I was able to come within reach of a group of eighteen, of which I secured ten. The biggest number ever seen on one frond was thirty-two (21/11/18).

The largest specimen was a female, $2\frac{1}{4}$ inches in length and $12\frac{3}{4}$ inches across the wings. Female, 58, 0, 29, 17, 144-324.

MOLOSSIDÆ

Chærephon emini, De Wint.—A single specimen of this bat was collected at Dar-es-Salaam on 7/11/19. There were

large numbers of these bats in the roof of the Kaiserhof Hotel and adjoining buildings. Length, $2\frac{3}{4}$ inches; across wings, $12\frac{1}{2}$ inches. Male, 65, 46, 12, 17, 150–318.

Chacerephon limbatus, Peters.—This specimen was very abundant in the neighbourhood of Mombasa, being a perfect pest in some of the houses at Frere Town, where they lived beneath the roof. Considerable variation in colouring was to be seen in the large series of skins collected. The parti-coloured brown and white of breast is most common, but in many specimens the white was almost absent, the darker colour of the flanks impinging upon it. In the young the darker colour was more of a blue-black than brown. In the adults brown of the back fur is liberally sprinkled with white hairs. The largest specimen was a female $2\frac{1}{4}$ inches long and $11\frac{1}{4}$ inches across the wings. Female, 58, 34, 5, 16, 133.

SORICIDÆ

Crocidura fumosa johnstoni, Dollm.—This small shrew was occasionally found when clearing away sisal fences at Morogoro. This sisal harbours much dirt and many small creatures. On one occasion a shrew, only 3 inches in length, was put into a tin with a mouse (*Leggada bella*, subsp.) and a gecko (*Hemidactylus brooki*). On opening the tin a very little while after it was found that the shrew had killed and eaten the mouse except for the feet and a few fragments of fur and skin; the tail of the gecko had also been devoured. Male, 90, 57, 14, 10.

Crocidura hirta, Peters.—A single specimen was found bottled in a German house at Morogoro; after spending four months at Lumbo a specimen was found dead upon the railway line only a day or two before departure, so it can hardly be reckoned as common there. Female, 92, 51, 12, 6.

MACROSCELIDÆ

Rhynchocyon petersi, Boc.—At Makindu (Shell Camp), 20/7/16, I was brought a large and handsome Elephant Shrew, shot in the bush near by. Female, 270, 213, 83, 32.

Elephantulus ocularis, sp. nov. Kersh.—This new species of Elephant Shrew was common at Dodoma, though very difficult to obtain owing to its custom of bolting into the densest thorn-thickets when approached. One of the largest females measured 142, 120, 33, 24.

Petrodromus nigriseta, Neum.—Not very common in open bush near Morogoro. A specimen was shot one morning (12/6/17) on a path which was being crossed by a safari of siafu. The stomach of the shrew was full of the ants. It seemed a most extraordinary thing that so timid a creature could capture and eat siafu. Largest specimen taken was a female, 225, 170, 50, 36.

Petrodromus rosvmæ, Thos.—These shrews were heard on several occasions, but not seen for two months after arrival at Lumbo. Local natives were then consulted, and we learnt that the creatures might be captured with comparative ease. Bag-nets are made with fine sisal thread; the closing thread around the neck is attached to a twig fixed in the ground alongside the path where the bag is set open. A drive is then made by natives pushing their way through the undergrowth; this is sufficient to scare the shrews along their runs. The action of the shrews bolting into the bag closes the neck of the bag so that the animal is netted uninjured and is picked up immediately by the following native, who, liberating it from the bag, transfers it to a sack. On arrival in camp they were chloroformed.

On examining their stomachs only ants were found; but at 7 p.m. one evening I saw a young one which had been liberated in my boma pounce upon a large burrowing cricket, with which it ran under the bed. Its actions were as rapid as those of a cat under similar circumstances. Feeding them in captivity was not a difficult matter, as the place swarmed with ants: a piece of bad meat was put in the shrew's cage; in a very short while a steady stream of ants was going to and from this bait; these were licked up by the shrew as required. Both old and young drank diluted Ideal milk, though one could see that they were unaccustomed to drinking by the awkward biting way they went about it. Whilst drinking the nose was held up at an obtuse angle. How the

animals subsist here without water is hard to say; for a month past there had been no rain, the days glaringly hot and the nights close without a trace of dew except on two nights.

Only one young one is produced at birth, and this takes place during the month of October. Two young males, born on the seventeenth of the month, measured 3 inches in head and body and $3\frac{1}{2}$ inches respectively; a foetal female on the same date measured $2\frac{1}{2}$ inches. A live young one brought to me on the twenty-first was $3\frac{3}{4}$ inches, whilst another found on the twenty-second was much the same—both of these were running about actively and difficult to catch. The largest male and female measured were: male, 190, 170, 48, 32; female, 195, 172, 48, 35. The average of twenty-two specimens of both sexes was 180, 157, 49, 31.

The ears of every adult specimen were in a very bad state owing to numbers of small grey ticks on the posterior border. Some ears were ragged, presumably made so by the scratchings of the animal in its attempts to rid itself of the irritating parasites. Here the ticks confined themselves to the ears, but at Morogoro the ticks on *P. nigriseta* were found all over the body, being particularly plentiful on the under-side of the tail. Round worms were found sparingly in the stomachs of several.

FELIDÆ

Felis leo massaica, Neum.—A lion passed through the outskirts of Nairobi on the night of 24/4/15—its spoor on the flower-beds in the Commissioner's garden was shown me; at dawn it was seen near the Arboretum. Lions were very abundant on the slopes of Mt. Siswa when we camped there (20/7/15), and a fortnight previously a lioness had been wounded almost on the very spot where our tent was pitched. When on picket at Longido West (22/11/16, etc.) it was a common occurrence to hear them roaring. When in open bush country near Moshi (15/3/16) a sergeant rising one morning saw a lion standing, looking at the bivouac, some four hundred yards away. Other observers took it to be a leopard, however.

At Gulwe, near Mpapua, where large herds of cattle were kept for military supply, they were a great nuisance. A lioness shot herself in a gun-trap one night, some two hundred yards from the open hut in which I slept. This was the fifth lioness obtained in a fortnight (20/4/17). The natives gathered round as it was being brought in, and one old crone mumbled 'Lions are just like men, they send the lionesses into the trap first and so they never get caught.' There was a general laugh at this, but another interpretation occurred to me. The lionesses might be greedy in pushing forward, and the lions politely standing aside reaped virtue's own reward.

Felis pardus suahelica, Neum.—At a military grass-cutting camp at Ngong a trap was set for leopards. One was caught, but during the night was attacked by two hyænas, who bit off its tail and snatched a mouthful of flesh from its haunch (20/9/15). Leopards were very plentiful at Longido West in January 1916. One afternoon a sergeant of the E.A.M.R. discovered one lying under a bush in a donga some nine feet below him. It made off immediately. Their coughing cry was to be heard by the pickets almost nightly.

One morning at Morogoro the writer received a message asking him to come and shoot a leopard which had been trapped near the German Mission. On arrival, however, I was told that the leopard had made off. At daybreak it had dragged the heavy trap on to a large rock, where it lay growling and worrying at the trap until 8.30 A.M., when it got free; it bounded off the rock to the ground some twenty feet below and went off on three legs. The trap had plenty of fur on the jaws and plainly bore the marks of teeth and claws (19/10/17).

It was also at Morogoro in the bush, just before sunset, whilst I was taking aim at a cuckoo, in line with the sights but at a distance of sixty yards, a half-grown leopard or large serval leapt down from a blasted tree on one of whose branches it had apparently been lying. On running to the spot its spoor was found, and about fifteen feet from the tree were also very fresh tracks of a bush-buck which had been pawing up the ground, presumably to get at some roots.

Acinonyx jubatus, Schreb.—On 16/7/15 a cheetah was put up at very close range near the opening gorge of the Kedong Valley, Naivasha end. It had been lying in open country with very little cover, but we did not see it until almost upon it. A paragraph appeared in one of the local papers about a pair of captive cheetah cubs—‘our representative who called upon them found them to be charming little fellows, allowing themselves to be handled freely, *sheathing their claws.*’

HYÆNIDÆ

Hyæna, sp.—One of the compensations of picket-duty at Longido West was to see the hyænas at daybreak disputing for, or gorging on, the offal which was left on the killing ground for them to clean up. One of the creatures passed within six feet of me on its way to supper one night. When taking a message across country near Mkomasi I met a hyæna at 3 o'clock in the afternoon, bright sunshine; a scrap had taken place just before lunch, and a body which I had passed ten minutes before was probably the cause for this activity.

When staying at West Kenia my host cautioned me not to put my boots outside the guest-hut at nights, as the hyænas would surely carry them off. He related how on one Christmas Eve he heard a noise outside. On opening the door an animal ran past; turning back for gun and lantern, he afterwards walked round the house, and in so doing came suddenly upon a large hyæna eating the leg of an eland which it had pilfered—it was then but thirty feet from the door. For some seconds it seemed dazed at the light and merely crouched over the meat, but recovering its senses bounded away, and as it did so he shot it dead.

CANIDÆ

Jackals were often met with, but no specimens collected. They appear to be very curious creatures. On one occasion, having shot a bustard on West Kenia plains, I was kneeling beside the bird, plugging nostrils and beak with wool. Some-

thing caused me to look round, and there stood a jackal scarce fifty yards away, regarding me intently. It cantered away only when I stood up—this occurred about 10 A.M. Another time at Lumbo, B.E.A., I had forced my way through some thick bush and was silently watching some waterfowl on the lagoon; a slight noise behind me caused me to spring round in time to see the disappearing flank and tail of a jackal not ten feet from me.

MUSTELIDÆ

Mellivora sagulata, Holl.—The only occasion on which a live ratel, or honey badger, was seen was at Longido West (22/2/16). About 2.30 A.M., whilst I was on picket on an 'ant-hill,' a small animal which I mistook for a 'Scotch Terrier' came trotting past. It was brilliant moonlight at the time. Some hours later, when taking my second watch, it returned and came sniffing up to within five feet of my blankets and within ten feet of a sleeping man. At Dodoma (4/12/18) two were caught in a trap set for leopards. I saw the skins, which were drying.

VIVERRIDÆ

Civettictis civetta orientalis, Matsch.—It is curious how a particular species may not be met with in a particular locality for a long time, and then for a short period specimens crop up continuously. I was in the Morogoro district for a year before meeting with a civet, and then two specimens came in on the same day, having been killed by motorists in different districts. The male, which had been shot, measured $44\frac{1}{2}$ inches from nose to tail, and its stomach contained skins of mango fruit (?), warningly coloured grasshoppers, many maggots, and parasitic worms. The female kitten had been run over by another car, and measured $31\frac{1}{4}$ inches.

One brilliant moonlight night at Morogoro (27/3/18) a terrific caterwauling arose in the bush quite near camp. The boys asserted that it was caused by civet cats ('Fungc') fighting. I got very near to them, when the outcry ceased as suddenly as it began, and I suppose they must have heard me. In a

mangrove swamp near Frere Town, Mombasa (20/5/18), there was a great outcry of natives and barking of dogs most evidently hunting something. I arrived just after the kill, for a civet cat had been hunted down and battered to death with clubs and sticks. The boys said that it had been after poultry, that the cackling of the fowls had started the dogs barking, and I presume the barking of the dogs had set the natives yelling. In November, 1918, I purchased two civet kittens from a native at Morogoro; they could just walk, and rather reminded me of collie pups, their feet being huge and out of proportion to their bodies. They would frequently stumble in their walk; when first received they hissed like snakes when approached, and gave vent to startlingly sudden spitting noises; after a few weeks this was given up and they became perfectly tame. I was too busy to look after them at the time, and so passed them on to someone who wished to take them home. Another man I knew had a civet kitten of the same age as mine and at the same time; judging by the three records, therefore, the young are born at Morogoro about the beginning of November.

Genetta, sp.—At Morogoro (10/12/17), on the slopes of the Uluguru Mountains, are many fine deep dongas. In one of these, nearly choked with euphorbias and other undergrowth, my boy saw a gennet cat leave its earth. He was sent into the donga to drive out anything that might be there. On hearing his cry not to shoot I came down from the top end and reached the spot where he was already clambering up the almost vertical cliff-like bank. On reaching the hole, and after a few minutes' work of breaking away the entrance, he drew forth a scratching, spitting kitten which he dropped into his haversack; a second was captured in like manner.

The earth, he said, was unlined but perfectly clean; it consisted of a circular chamber and two bolt holes beneath the roots of a tree that had long since disappeared. Whilst he was climbing up through the undergrowth of the further bank one of the kittens escaped from the haversack and got away in the long grass: we could hear it crying—more like a squeak than a mew—and heard the mother coming towards it, but it was already too dark to see anything.

For the first forty hours the remaining kitten hunger-struck, and when one approached turned on its side and spat and clawed. I must confess that I was somewhat afraid of it, its spitting was so alarmingly sudden and explosive ; realising that if this continued we should never come to terms, I picked it up and allowed it to bite, which I found was little more than a pinch, as its teeth had only milk dentition. A little rubbing of its ears and fore-paws eased its mind considerably, and it settled down inside my shirt whilst I wrote up these notes—this had its disadvantages, for, though beautiful and leopard-like in its markings, it teemed with ticks and fleas. Introduced to the baby lemur it nosed up in quite friendly fashion ; but the lemur, though only half the size of the gennet, reared up on its hind feet and then flopped on to the gennet's nose. This occurred each time they were brought together.

The kitten refused to touch meat, and milk it would only take if sweetened with sugar to the consistency of treacle. She drank water readily, though there was none anywhere in the neighbourhood of the donga where she was found. She was very fond of jam, and ate the contents of birds' eggs.

On December 27 a native caught an adult gennet, which was brought to me with a cord very tight round its neck and caged in a piece of wire-netting. On opening this there was a great exhibition of teeth and claws, accompanied by spitting. Just as it was being introduced to its cage it clawed the boy who was holding it ; he promptly dropped it with a yell.

We surrounded the grass hut in which it had taken refuge, and searched the grass walls carefully ; finally it was detected, and one native called out triumphantly that he had secured it in some towels. Once more, with greater caution, the door of the cage was opened and the creature tossed in, towels and all. Too dazed with such unusual treatment to move—there lay my gennet kitten on its head. I picked it up and comforted it, and the hunt for the old cat commenced once more and ended in its capture.

The cage in which the cat is put is 12 feet long by 4 feet wide and 5 feet high. The kitten has been put in with the cat, but gets out every night through the large wire mesh

and wanders about till daybreak. She resents being picked up, but once settled on one's lap she will sleep contentedly enough.

She frequently comes into my bell-tent at night and climbs up between the outer and inner canvas in search of insects, which are attracted by the light. One night she ate a large cricket which I had deviscerated and re-stuffed with arsenic-saturated wool and carefully set; this apparently disagreed with her, and she vomited up the lot within a few feet of the setting board. It is very pretty to watch her pounce on a locust, which is a favourite article of diet with her.

On the night of February 12-13 there was a great deal of caterwauling and fighting outside, and in the morning I found the gennet kitten dead and dragged with mud: it had apparently been killed by stray domestic cats. It measured 19 inches from tip of nose to end of tail. The old cat made a journey from Morogoro to Nairobi, living on 'bully' a good part of the way. In Nairobi it was given to a lady, who had it for a year or more; her little girl succeeded in taming it so that she might handle it; the gennet would not let anyone else come near it, however. Finally, its cage door being left open, it escaped, probably to make trouble for systematic mammalogists making subspecific local races.

Nandinia binotata arborea, Heller.—A specimen of this forest cat was shot by a sergeant of the E.A.M.R., in Meru Forest, near Arusha, Tanganyika Territory (12/4/16).

Mungos mungo, Gmel.—The banded mungoose, until recently better known as *Crossarchus fasciatus*, was common at Lumbo, B.E.A., though not in such numbers as the subspecies at Morogoro, G.E.A. The packs at Lumbo rarely exceeded five or six individuals. One burrow was found at the roots of a tree, another beneath a huge rock on the shore, others again were living in the termite heaps. The cry is a very bird-like note emitted when hunting; hunting consists in turning over stones and scratching for insects in likely spots. When captured by the scruff of the neck these animals squeal deafeningly.

A female and young one which were brought to me alive

were in a very emaciated condition, being literally riddled with what I took to be the larvæ of the Tumbo Fly (*Cordylobia*). The maggots after evacuating for purposes of pupation left great raw holes. The tail of the adult was particularly infested.

The largest male and female taken measured $22\frac{3}{4}$ inches and $23\frac{1}{4}$ inches respectively, from tip of snout to end of tail. Male, 370, 210, 67, 28. Female, 360, 230, 70, 25.

Mungos mungo colonus, Heller.—Several specimens of this race were taken at Morogoro, where it was particularly plentiful. Four records were made of birth and age of young. A female with very small fœtus was found (11/11/17), a single naked young one no larger than one's thumb in a nest (7/8/17), an unweaned kitten in the road (3/11/17), and two kittens able to run about and feed themselves (3/3/18). The notes at length are as follows:—

(7/8/17.) 'In clearing some land near here the boys found the dead body of a female mungoose considerably decomposed; near by was a nest containing a young one about the size of one's thumb. I kept this alive for three days on diluted Ideal milk, but though it drank eagerly it appeared to pass no excreta, and the stomach increasing in size, it finally died. I intended to preserve it but was frustrated from doing so by an adult Mungoose, which, in its daily cruise about the camp in search of tit-bits, was seen to carry it off.'

(3/2/17.) 'Returning home about 6 P.M. after a heavy downpour of rain which had left the road in a semi-flooded state, I noticed a dozen men watching what I took to be a kitten; it looked very forlorn and uttered a shrill, piercing cry not unlike the note of a canary. On closer inspection it proved to be a very young mungoose no larger than a rat and which had presumably been washed out of some drain. It ran well, and when covered with a towel bit its captor fiercely through it. Carrying it to my quarters, I provided it with milk, raw liver, and boiled meat, none of which it touched excepting the milk in which it lay down. All the time it persisted in its monotonous cry or whistle.

'The immediate effect of its cries was to elicit an answering call from a stray cat downstairs—such a cry as a cat answers

her kittens with. Presently she came up through a hole in the floor and approaching the box with caution, stood upon her hind legs and viewed the prisoner through the wire netting. As it continued to cry all night and was a nuisance to the neighbours, I ch'oroformed it in the morning. Male, $9\frac{3}{4}$ inches, of which $3\frac{3}{8}$ inches was tail.'

(3/3/18.) 'Purchased two young mungoose which had been found running about by a native child, they followed to heel in the most remarkable manner and in this way accompanied my boy home for a quarter of a mile. In build they are rather otter-like, but in size no bigger than a large rat. When introduced to the monkey, they sat up on their hind legs with their short fore-paws dropping on their stomachs—meerkat fashion—then they spat explosively and pretended to bite. They are very quarrelsome; fighting over tit-bits of food. Though so small they are well able to look after themselves and spend their time running hither and thither, rooting about or digging up insects with their strong claws.'

Except when fully fed they keep up a continual bird-like chirping and cheeping. Except for the first week I did not shut them up at nights, during the day they were always free to wander about, but never seemed to go outside a radius of 200 yards from their sleeping box. After three weeks they made up to the monkey, and it was a pretty sight on a hot afternoon to see the three of them lying together in a shady spot.

A dead cobra being brought me, I gave the body to the mungoose after first cutting off the head. It was most amusing to see the caution with which they approached it and sprang back, apparently with the object of 'drawing it' if alive. The bristles on their otter-like tails stood up. When sufficient courage had accumulated, they first attacked the tail which they worried and bit and afterwards gorged themselves on the entrails.

Their method of dealing with eggs was most interesting. They would roll the egg towards some wall or solid object. When near enough it would be taken up in the fore-paws and held against the chest; standing on its hind legs, the creature would then waddle a little closer to the wall, turn its back upon

the wall, straddle out its legs and suddenly fling the egg between them against the wall with the result that the egg would be broken and they could devour the contents. Given a large cockle-shell they went through the same performance, but never succeeded in breaking the shell; they grew very excited and would steal the shell from one another and each try their hardest.

The attitude of adults to snakes was interesting; a dead snake they would always devour, a live one aroused interest, but they were excessively cautious. Even when a harmless species such as a brown house snake was turned out in the open the mongoose would treat it with respect, running in to bite at the tail and jumping back before the snake had time to strike.

In the stomach of one specimen examined were the following—three frogs, two centipedes, four slugs, a carabid beetle, cockchafers, cockroaches, locusts, grasshoppers and a large spider. This gives some idea of the omnivorous nature of their dietary, and shows how useful they must be in assisting to keep down a lot of undesirable insects. The quantity consumed by one mongoose in the course of a day must be very large.

There were some peculiar parasitic worms in the intestines of a male specimen that was shot. These were *Porocephalus* sp., a worm usually found in pythons but which has also been found in man (native, Dar-es-Salaam, 1918). In the case of this mongoose it is probable that it had eaten a snake, and so introduced the parasite into its own economy. Fleas and ticks were very abundant in the fur of most specimens.

Herpestes sanguineus ibeæ, Wrought.—A single specimen was obtained at Msiha River, Makindu, G.E.A. (Shell Camp).

Herpestes mossambicus, Matschie.—Four specimens were shot or dug from their burrows at Lumbo, B.E.A. It is a handsome species, of general rufous colour with black-tip to the tail. The head has a particularly evil appearance, due in part to the fierce eyes and very small ears. They are expert climbers, and remind one of martens when so doing. A pair kept in confinement were as fierce and implacable after a month's captivity as on the day they were caught. During this time they were fed upon bullock's flesh cut into very small pieces. They drank water. Their glossy coats testified to

their good condition and their stomachs were very full when dissected. The largest male measured $20\frac{5}{8}$ inches (284, 240, 57, 23) and the largest female $21\frac{3}{8}$ inches (300, 250, 55, 23).

Helogale ivori, sp. nov., Thos.—These small mongoose must be very abundant, though more often heard than seen. They make quite a noise as they run about in the undergrowth hunting for the insects upon which they feed. Immediately they become aware of the presence of anyone in their vicinity they make off. They live in the holes of termite-heaps, which are such a feature of the country around Lumbo where they were met with. They are fond of lying near their holes and sunning themselves in the early mornings. Four and five respectively were dug from two of these holes one morning. In one instance they were found inhabiting the same hole as a large lizard (*Gerrhosaurus major*); a still stranger companion was a five-foot snake (*Rhamphiophis oxyrhynchus*) which was taken out of the same burrow as two mongoose.

No nest is made, and the female brings forth her young in the bare earth during the month of October and possibly November. A litter consists of four or five young (three observations); when born they measure male, 69, 32, 7, 5, and female, 65, 33, 12, 5. The young have a bird-like cry. In captivity they were kept on an almost exclusively meat diet. They showed a great liking for crickets which they would snap out of one's fingers in their eagerness. Crabs were also relished, though not to the same extent. Butter they would not touch; a single individual developed a liking for jam; cheese, chicken and eggs were taken; the latter are broken open in the same way as practised by the banded mongoose.

On an underlined sand snake (*Psammophis subtaeniatus*) being introduced into the cage, it was immediately pounced upon and crunched up, the whole of it was apparently eaten by the one mongoose which growled like a cat continuously and flew at its mate whenever she ventured near, which she did again and again. Lizards were also seized with avidity. This mongoose is in the habit of sitting up on its haunches with its fore-paws resting on its stomach after the manner of a meerkat. They also showed great expertness in climbing the shrub which was put in their cages.

The largest male measured $14\frac{7}{8}$ inches (242, 135, 40, 20), and largest female, 15 inches (240, 140, 40, 20). Over twenty specimens were obtained.

Tumbo fly had infected one specimen, but the remainder were apparently very free from parasites, they kept themselves very clean externally, but one rather shirked the examination of their stomachs as these smelt so strong.

SCIURIDÆ

Paraxerus flavivittis mossambicus, subsp. nov., Thos.—A long series of this new sub-species was obtained at Lumbo. It is possible to live in close proximity to these squirrels without being aware of their existence, so expert are they in climbing round the trunks of trees, flattening themselves out on branches and making themselves scarce generally. They are extraordinarily fond of heat ; soon after sun-up they crawl out on a branch, and flattening themselves out to absorb all they can, they bask like lizards. Young ones would lie at 3 o'clock in the afternoon on a table in the full glare of a sun that quickly rendered metal tools too hot to handle. Whilst in captivity adult-caught specimens seemed but little tamer after three months' confinement, young specimens go to the opposite extreme and seek human companionship.

The young are brought forth in September (three observations), the nest is composed of a mass of fine grass and is placed in a hollow tree-trunk. Young taken on October 4 from such a nest were fed on milk for the first few days, then they were given sugar and raw oatmeal, and in due course ground-nuts, potatoes, bananas, jam and milk puddings. The favourite food was bananas, over which they would grow quite excited. Natives assert that they gnaw holes in clothing (!), on one occasion I disturbed one in my tent.

After the first three days in captivity the young ones were allowed their liberty and slept wherever they liked, above all they preferred a sack of kapock. They would burrow into this and not re-appear until 11 A.M. next day. It is difficult to know how they could breathe in such fluffy stuff. In the mornings they would climb a mango tree and bask in the

sunshine until called down by the sight of food. A plantain-eater was kept in a large cage on the ground and they would get in through the wires, climb into the porridge plate and sprawl about eating heartily. They were but little larger than the plantain-eater's head, yet the bird never molested them, but would continue feeding with the uninvited guests.

On another occasion one of them was plundering the food of an old male squirrel, when he came down from his sleeping-box, approached slowly, then suddenly snapped viciously at the intruder. The little creature only moved slightly so that he missed his aim; this was repeated a second time with like result. Then the old squirrel, apparently 'liking its style,' pounced upon the mite and gave it—a licking from head to tail.

The largest male measured $13\frac{1}{4}$ inches (176, 160, 40, 15), and female $13\frac{3}{4}$ inches (175, 175, 40, 18). Average measurements of fifteen specimens of both sexes was 162, 159, 39, 17.

Paraxerus ochraceus, Huet.—Specimens of this squirrel were collected at Morogoro, Dodoma and Kongwa. The largest specimen came from the last-named locality, and was a female $12\frac{7}{8}$ inches in length (174, 152, 35, 21).

Paraxerus ochraceus aruscensis, Pagen.—Collected in Mt. Meru Forest, a few miles from Arusha. This species is also common at Mombasa and Frere Town where specimens were taken.

Paraxerus ochraceus jacksoni, De Wint.—The common forest squirrel about Nairobi. Attracted by the cries of some birds on the outskirts of the Parklands Forest, one of these squirrels was observed turning round and round a branch like a Catherine wheel, though more slowly. It made off immediately on being approached, and the birds also scattered, to continue their outcry at a more discreet distance; a puff adder, however, was found lying on the ground about eight feet from where the squirrel had been performing. Probably the squirrel had seen it also, and was showing his objection to the disquieting discovery in his own fashion. The largest specimen was a male measuring $14\frac{1}{4}$ inches (180, 180, 38, 19).

Xerus rutilus saturatus, Neum.—Was very common in the neighbourhood of Longido West. It was probably the same

ground squirrel that was seen at Mbunyi and Mkomasi. A Longido female obtained on January 31 measured $17\frac{3}{4}$ inches (242, 216, 53, 18), and had two foetuses in uterus, nothing but green leaves in stomach.

CRICETIDÆ

Taterona leucogaster, Peters.—Three specimens of these light brown rats with white bellies were dug out of ant-heaps.

The largest specimen was a female measuring $9\frac{3}{4}$ inches (140, 154, 35, 20), the biggest male was only a little shorter in the tail.

Taterona swaythlingi, sp. nov., Kersh.—Common at Morogoro, especially under sisal hedges, in the clearing of which a good many specimens were obtained. The largest male measured $12\frac{1}{8}$ inches (180, 128, 37, 22), the largest female $12\frac{1}{4}$ inches (140, 171, 34, 21).

Taterona taboræ, sp. nov., Kersh.—Obtained at Tabora, all the specimens had their ears affected with a mould or lichen-like parasite.

MURIDÆ

Stenomys loveridgei, sp. nov., Thos.—A single specimen of this fat mouse was obtained at Lumbo, 1/10/18. It measured $4\frac{3}{8}$ inches (male 77, 35, 15, 18).

Rattus fumatus, Peters.—Very common at Morogoro, where a large series was obtained. They were commonly found beneath any object in the bush or fields, particularly near dwellings.

Rattus coucha, subsp.—This species was also met with at Morogoro, a male was found in its nest in a hollow tree at about four feet from the ground, it bit fiercely on being picked up. Another specimen was taken as it emerged from a hole in the ground.

Rattus coucha panya, Hell.—Very common at Nairobi, where it is so bold that it will come out and feed in broad daylight.

Leggada bella, subsp.—Taken at Dar-es-Salaam. A single male measuring $3\frac{3}{8}$ inches (48, 37, 11, 10).

Leggada bella, subsp.—Several specimens were taken at Morogoro. Two females measured 4 inches (53, 46, 12, 9).

Leggada bella, subsp.—A pair were taken at Tabora. The male being just under 4 inches (55, 45, 12, 9), and the female $3\frac{5}{8}$ inches (50, 42, 12, 8).

Arvicanthis abyssinicus neumanni, Matschie.—This sandy-coloured rat was very abundant at Dodoma in the thorn-bush and in open spaces in the village. It runs about during the heat of the day, but bolts into its burrows at the base of a thorn-bush when anyone approaches too close. I was told that twenty-four were captured in four wire traps set in a store during the course of a day. One of the specimens collected had three legs afflicted with what appeared to be elephantiasis. Some three dozen specimens were taken; of these the largest male measured $10\frac{3}{8}$ inches (150, 113, 24, 17), and female $9\frac{1}{4}$ inches (125, 110, 25, 15).

Lemniscomys griselda rosalia, Thos.—At Morogoro a few specimens of this striped rat were taken, but the animal was far from common. A male measured $10\frac{1}{4}$ inches (21, 140, 26, 19). A female measured $9\frac{5}{8}$ inches (115, 130, 25, 19).

Grammomys surdaster, Thos. and Wrought.—At Morogoro and Lumbo. In both cases the animals had built their nests within those of weaver birds at a good height from the ground. Male measured 10 inches (108, 146, 48, 16).

An immature pair were taken in their nest which was constructed within that of a weaver bird, situated in a bush at a height of 5 feet from the ground. They were kept in captivity for a week and would eat almost any kind of food. The male escaping on September 20, 1918, the female was chloroformed. That the male was still in the vicinity of the tent was evidenced by sundry depredations. Exactly a month later this rat was taken in a fold of the tent in which it had gnawed a large hole and carried up fine shreds of grass wherewith to make a home for itself.

PEDETIDÆ

Pedetes surdaster, subsp.—Jumping Hares were to be found outside Morogoro. At Tabora a specimen was caught by some

natives after a heavy downpour of rain which was supposed to have washed it out of its burrow.

BATHYGERIDÆ

Heliophobius argenteo-cinereus, Peters.—This large grey mole rat was occasionally brought in by the natives who dug it up in their gardens. A male measured $6\frac{7}{8}$ inches (168, 6, 29, 0), a female was $5\frac{1}{2}$ inches in length (133, 7, 29, 2).

HYSTRICIDÆ

Hystrix galeata, Thos.—Six porcupines were killed in the course of a few weeks on an estate at Muthaiga, near Nairobi (June 1915). They do a great deal of damage, eating quantities of maize cobs, which they obtain by gnawing through the stem until the plant falls. When visiting at the house one day, a bull-terrier came in bristling with quills, blood running from his right shoulder, and lame in his right leg. It was thereupon decided to unearth the offender, and four kerosene tins of disinfectant were prepared and poured down one of the holes or entrances to its burrow. It did not bolt from the other outlet, so both holes were blocked up and a dozen natives sent into the thick scrub behind to beat it out, whilst a gun guarded the holes.

After a wait of nearly twenty minutes there was a grunt and a rush through the undergrowth, the beast suddenly appeared and dived into one of the entrances to the burrow, two dogs who were following at his heels were soon on top. A great pandemonium ensued, dogs and quills were falling in all directions, growls, yelps, squeals striking on the ear simultaneously defied description. In less time than it takes to relate, however, the porcupine scrambled out and made away through the cover, we in pursuit; but it made good its escape.

At Dodoma a well-used earth was found beneath a large rock, and a friend meeting the porcupine early one morning, shot it.

LEPORIDÆ

Lepus capensis abbotti, Holl.—A single specimen was obtained near Dar-es-Salaam. Male.

Lepus whytei, Thos.—Half-a-dozen leverets were brought to me whilst at Lumbo, between July 10 and October 1. The young are evidently brought forth during the whole period, possibly all the year round. Two leverets were found in one form, usually they were found singly, as if only one were produced at a birth.

They make delightful pets, but are only short-lived in captivity. Four very small ones succumbed to diarrhœa, though their Ideal milk was diluted with six parts of water. Their milk was fed to them through a glass blow-pipe, one end of which was retained in the writer's mouth so that the fluid should not flow too fast; they sucked eagerly at the tube, and one individual, if shewn the tube, would hop about the table after it. This specimen, after being fed a week upon milk, took to nibbling grass, and appeared to be doing all right, when an accident occurred. Whilst 'out to grass' in charge of a native, it bolted. On overtaking it the boy pounced upon it as it squatted in a clump of grass. One of the blades, presumably, punctured the eye. From that time it moped, refused food, and died on the third day after.

Another was kept for over a month fed upon a mixture of tea leaves and stiff porridge, with the addition of greens when obtainable. Its death was also an unusual one. Its run, which was 8 feet long by $2\frac{1}{2}$ feet broad, was invaded one night by ants, which apparently attacked eyes and mouth; in the morning it was found dead with the lips badly eaten away. When out in the bush they were not often seen—possibly one per week. They appear to be quite unable to rid themselves of burrs when these become attached to the fur.

SUIDÆ

Potamochoerus chæropotamus, subsp.—At Morogoro, on January 9, 1918, some natives brought me five young wild pigs, characteristically striped. The mother had left them under a bush in a rubber plantation. They averaged 14 inches in length, of which $3\frac{1}{2}$ would be tail.

PROCAVIIDÆ

Procavia frommi, Brauer.—Rock Rabbits were common, both at Dodoma and Tabora, where they were found on rocky kopjes. They might often be seen on the branches of trees as well as on the rocks. They always carry a lot of worms in the stomach, both Nematode and Cestode. The following were found in one Dodoma specimen :—*Crossophorus collaris*, *Hempri* and *Ehrb*, *Anoplocephalus spatula* v. Linst., *Inermicapsifer*.

The largest male (Tabora) measured $17\frac{3}{4}$ inches (450, 0, 62, 29), and largest female (Dodoma) $18\frac{1}{2}$ inches (470, 0, 67, 35).

Procavia, sp.—When at Morogoro I saw some skins of a Hyrax exposed for sale in a Greek's shop. I inquired where they were obtained and learnt that they came from near the top of the Uluguru Mountains. I made it known among the boys that I would be glad to purchase specimens if brought in the flesh. It was more than a year before a specimen was brought to me. It was a female measuring $23\frac{1}{2}$ inches (595, 0, 79, 32). In the uterus was an embryo 38mm. long, with a coccyx 1mm. in length.

MANIDÆ

Manis temmincki, Smuts.—On January 10, 1918, a native brought me a pangolin which he had captured near Morogoro. He had inflated views of its value and wanted 27s. for it, so that I did not purchase it. He returned on the 15th inst. and sold it to me at a more reasonable figure. It was well over three feet in length. When all was quiet it would cautiously unroll, revealing its long pointed nose; if nothing happened it would then begin to trot away with the fore-legs, looking painfully awkward, almost as if the creature were trying to walk on its wrists, nevertheless it managed to travel fairly quickly. It rolls up immediately on being disturbed, and gives a little snort of annoyance; if you then attempt to pick it up, its plaited tail flies round with good force and then returns to protect the head. I spent two hours in making a run secure—as I thought; twenty minutes after being put in, however, it had disappeared, and was not to be found, though forty boys were out looking for it with lanterns. On February 1 a young

specimen about 18 inches in length was brought me, but I did not purchase it.

ORYCTEROPODIDÆ

Orycteropus æthiopicus, Sund.—Aard Vark, ant-bear or earth-pig, as they are variously called, were common at Morogoro and Tabora, but never seen unless dug for. Having located a burrow at Tabora on December 11, 1918, I set eight boys to dig it out at 7 A.M. They kept on till I joined them at 4 P.M., having knocked off work for an hour at noon. They had dug a furrow about twenty feet long and varying in depth from six to ten feet, they reported having twice caught sight of its tail. I kept them working fast in relays and presently saw what I took to be a foot throwing back the earth. I fired at this, but it proved to be the tail which is extraordinarily thick and an aid to the feet in throwing out the soil.

After another half-hour's digging, a boy seized the creature by its tail, two more boys held on to the first boy's legs, nevertheless, he was slowly but surely drawn into the burrow up to his waist. Muffled cries proceeded from him and finally letting the animal go he was pulled out fairly smothered in the loose, sandy soil. Digging at once went on, and when the creature was again sighted ropes were attached to the two hind legs, these were used to draw it like a refractory cork from a bottle, it was not long before one was snapped, but the creature came out, plunging like a tethered bull. To my great surprise it was about five feet in length, and a couple of feet in height. I fired at it at a distance of twenty feet with No. 5 shot from a 12-bore, the shot hit it in the neck, but it took no notice except for a sudden plunge. A boy then approached and brought down the heavy end of a mattock on its head with full force. This resulted in the animal rearing up on its hind legs, snapping the second rope, after which it broke away across country at a peculiar yet fast gallop. It went to earth in a burrow on the railway embankment, and as we arrived at the spot, all that was to be seen was a few handfuls of earth being flung out.

If it had not been that the creature was possibly wounded more severely than was apparent, I should have liked to have ceased the chase and given it its well-earned liberty. Quite fifty natives had collected by this time and eager hands were

soon at work digging, when suddenly the ant-bear turned and charged out of the burrow, natives fell over in every direction and got in each other's way. A Kavirondo brought his club down on the animal's head which only had the effect of breaking the club, the animal continued for a hundred yards and went to ground in another burrow.

Someone seized its tail and hung on whilst others attempted to fasten ropes, boy after boy fell back to spit sand from his mouth, and clear it from his eyes and hair. The sand continued to be thrown out in powerful jets. A rifle which had been sent for arrived at this juncture, and a couple of shots killed the poor creature without further delay. It was found to measure $68\frac{1}{4}$ inches of which $23\frac{1}{4}$ were tail. (Male 1140, 590, 225, 175.)

For Notes on Horned Ungulates, Elephant, etc., see index to Natural History Diary for the period 1915-1919.

THE RAID OF THE PONERA

AN IMPRESSION

BY R. HARGER

An hour before an African sunset on the coast near the Equator. This afternoon there was heavy rain which lessened to a drizzle and has now ceased. The air is still, damp, and quite chilly in comparison with the pre-storm midday heat, which has left the earth much warmer than the atmosphere. Thus, already a slight haze is produced which is noticeable even within fifty yards. The light is subdued. Excellent conditions for certain insects to be on the move, especially those which travel on legs alone.

What a world to tackle for those whose eyes are, maybe, but one-sixteenth of an inch or less above the ground!—eyes which perhaps are not very keen of vision or long of focus.

Along a slight track, worn by native feet, are many obstacles. Many small pools of water held and bordered by fine mud. Here a sodden and tangled mass of grass stems. There a small washout still holding water held back by dams

of dead leaves. Fallen from the trees above are many sticks partially embedded in mud. On the adjacent land untrodden by human feet, these obstacles are greatly increased in magnitude and number. Here the termites (white ants so called) revel in luxury.

Keep your eyes on the clearer pathway. Wait patiently; something may appear. What is that? About thirty feet away on the pathway is a blackish streak a few feet long. A disturbed nightjar diverts one's attention for a few moments, but look again. The streak is not so long as it was. It is moving. A slight undulation in the ground has apparently shortened its length. Go closer. It consists of insects. Go closer still. They are black ants of equal size, on the march five or six abreast, in irregular formation of a column about five feet long. Half a dozen scouts are three or four inches ahead of the main body.

Stoop and puff a breath on the middle of the column. It expands slightly, but quickly regains formation. Go ahead and put a stone right on the line of march. A slight check results and the column winds round it. Go ahead again, and with a stick score a rut right across the track. The leaders stop. The head of the column slightly expands. Willing investigators dart out. No danger. The ants pass through the rut and regain formation, the scouts constantly falling back and being replaced by others.

We must cease to worry them. Evidently they are moving with set intention, some definite business ahead. What can it be? Let us wait and see. There they go at a steady pace of about two yards a minute, every individual well separated and self-reliant, yet forming part of a body which is perfectly self-contained. A small brown field cockroach carrying a cachet of eggs darts out from a grass clump, attempts to cross the path, nearly collides with the column and darts back. The ants take no notice of her. Without doubt they are after better game, the search for which concerns every member of the party. Watch their antennæ, which are held with points held downwards, but are constantly raised for a second or two as if feeling for some wireless message.

A few yards more of orderly march and then—the leading members hesitate for a moment. The head of the column

opens out. Instantly the formation is broken. Every member breaks off almost at right angles to the line of march at much increased speed. To the human eye there is nothing to account for this rapid dispersal. The direction is towards a small open space where lie sticks and prone tangled stems of sodden grass, five or six feet distant from the pathway. On reaching this every ant uses his jaws. Many curve their bodies in exerting all their strength to remove bits of mud and vegetation. Other jaws appear from below—yellow jaws. Termites are here, hence the felled stems of grass. The fight has begun. The black ants quickly open up the white ant runs, which, owing to the recent heavy rain, had no visible surface earthworks. The termites, lovers of darkness, are seized as they come to the surface. Some manage to leave the burrows, and to slowly wander on the surface with uplifted jaws in readiness for the downward stroke, but very soon they are seized bodily by black jaws at the side or rear. At the holes a few pairs of yellow jaws have been buried in black bodies which are curled in the death-struggle, for the grip of the termite is a terrible grip. Black ants are scouting the vicinity and exposing more passages. The fight has now lasted for about three minutes. The combatants are spread over five or six square feet.

Suddenly, as if by pre-arranged signal, the outlying raiders cease their work. They feel the air for a moment, and then concentrate on the main body of blacks which are already moving towards the pathway whence they came. The fight has ceased. The return journey has commenced, but the struggle has not been entirely one-sided. Five or six black bodies can scarcely move. Perhaps as many more, sticky with termite secretion, have been dragged underground. Nearly every black ant carries a white victim, now motionless in black jaws. Nearly, but not all, for on reaching the pathway the column reforms, heading whence it came and led by unburdened scouts. A few others flank irregularly. The remainder gather in the rear. The main body carries the spoil. All resume the former steady marching pace.

But observe : away back some few feet is a black straggler who is evidently endeavouring to rejoin the column. His effort is great, but his pace is slow, like a very lame horse in

a hurry. Something is attached to one of his hind legs. The writer stoops to investigate, and with a bit of grass holds the obstruction to the ground. It is an atom of dry vegetation attached by a viscid substance, perhaps termite secretion. The ant struggles, frees itself, and greatly increases speed towards his retreating companions. He has a long distance to go, but manages to join up. The column is now well away on the homeward journey at a steady pace, and turns from the path into the grass without hesitation. The dark stream enters long grass. The sun has set, and the rapidly waning daylight is insufficient for further observation. No doubt the column will disappear down some hole at the base of a tree or stone.

Such is a raid of the *Ponera* Ant in an organised body, which, for cohesion, mobility, elasticity, and unity of action, could not be excelled by any human gathering, and cannot be accounted for by the mere word instinct—a word so easy to jerk off the end of a pen, and yet so difficult, even impossible, to define with the combined aids of human speech and reasoning.

Wherefore, this effort to picture in words what the greatest masters of the brush could but portray in sombre colours, which would appear very flat without detailed action. A series of still photographs would serve the purpose no better. A series of cinematograph pictures would be nearer the mark, but surely a streak of small objects moving for half an hour at a uniform pace, and this to end in a three-minute struggle, would make a poor picture. No, there are some actions and efforts of which descriptions had better be left to words, however faltering and inadequate such words may be.

THE MIGRATIONS OF BUTTERFLIES

BY H. L. ANDREWES

The fact that large numbers of butterflies have the habit of travelling in a body in a fixed direction at certain times is well known, and many records of such movements are to be found in various scientific publications. Several species,

belonging to several families, are recorded as having this habit, *e.g.*, many Pieridæ, *Euplœa* among the Danaidæ, *Pyrameis cardui* among the Nymphalidæ, *Polyommatus bæticus* among the Lycænidæ, and *Calpodès ethlius* among the Hesperiidæ. Beyond the bare fact that such migrations do take place but little seems to be known. It is always assumed that the necessity for ensuring an ample food-supply for the succeeding generation causes these movements, and in the absence of any evidence to the contrary this must be accepted as the true reason. The depletion of the food-supply following on an abnormal increase of the numbers of the caterpillars in a district, or an insufficiency of food due to drought or any other unfavourable condition, is ample cause for an exodus from the district. This is as obvious in the case of butterflies as in the case of mammals or birds ; but there is a fundamental difference between the cases. Butterflies have a life of only a few weeks (if we except the few that hibernate in temperate climates), whereas the higher animals live for some years. When, therefore, a migration becomes imperative for the latter, they are practically certain to have among them individuals with previous experience to guide them. With butterflies the migration takes place without any such help. It is this fact that makes these journeys of hundreds of miles so wonderful. It is incredible that flocks consisting of myriads of butterflies should all go in one direction in search of food on the mere chance of arriving at a suitable spot. We are compelled to fall back on instinct for an explanation. Lemmings have this inherited impulse, or instinct, to migrate at times in a certain direction ; in their case it leads to their undoing, for they tumble into the Baltic and drown where their ancestors found dry land. Does some similar fate overtake the butterflies ? It is to be supposed that on arriving at their destination they will find, as a rule, the district already occupied by residents of their own species ; so that unless the vast majority come to grief, over-population must occur in the new district and the trouble continues. So another migration must take place, and so on indefinitely. Until voluminous and accurate data are collected from all parts of a country their movements cannot be traced. Although to do so, especially in a country like East Africa, with its

small white population, is difficult, it is not impossible. Even supposing their movements to be traced, there remains the problem of the origin of the habit. It probably began by small migrations. It is conceivable that in past times their foodplant existed in a belt, or a wide sheet, which with geological and climatic changes became broken up gradually into discontinuous areas, so that the small migrations became slowly lengthened out until they reached their present great length.

Evidence is badly needed as to the proportions of the sexes in the flocks. In one observed by the writer recently, males and females were in about equal numbers. Canon Rogers, in a letter to the writer, says: 'There is some evidence that they frequently consist mainly or even exclusively of ♂♂.' If the latter statement proves to be correct on further investigation it will add a complication to the problem.

The following facts were noted by the writer in connection with two migrations of the Pierine butterfly *Belenois gidica*, passing eight miles N. of Lumbwa Station. The first began towards the end of January, 1921, lasting until about the middle of February. The direction was rather W. of N.W., so that those passing the point of observation were on a line which would eventually take them between the N.E. corner of the Victoria Nyanza and Mount Elgon. This flight was also seen by the writer about Mola Station, going in exactly the same direction. The second, an even heavier migration, was seen first on March 2, travelling about N.N.W., or in a direction which would clear Mount Elgon on the E. This continued for about a fortnight. When high hills are reached there is no deviation; they pass over the hills without changing their direction. When blown off their course temporarily they seem to make up the leeway as soon as opportunity occurs. They fly as a rule near the ground, but many are to be seen at a height of fully 100 feet, especially over hill-tops where they adopt a lazy, floating mode of flight. In a violent gust of wind those passing over a forest-clad hill-top dropped and settled on the ground and shrubs in the forest, until the wind was normal again, when they resumed their journey at once. The speed varied, according to the direction and force of the wind, from as low as five or six to as much as twelve miles an hour, averaging about nine miles

an hour. They got under way about 9.30 A.M., and began to settle down for the night on low herbage towards 5 P.M., when it was noticed that a certain amount of pairing occurred. The flight goes on without cessation, except when the sun is obscured, when they settle until it is fully out again. The only other stoppage is for short visits to flowers on the way. The few left in the district when the migration has passed by consist largely of very dwarfed examples, some no larger than a *Polyommatus beticus*, presumably weaklings unable to continue the journey.

The only other records in the writer's possession are contained in the above-mentioned letter from Canon Rogers, dated March 8, 1921, in which he says: 'We have had two marked migrations in these parts [Kabeti] a few weeks ago, i.e., *Catopsilia florella* going N. followed by *Belenois mesentina* going S.'

Any notes, however seemingly trivial, on this subject will help towards solving a very interesting problem. In all cases a fair number of specimens of the butterflies (in paper triangles) should be sent if possible, accompanied by accurate notes on dates and duration of flight, direction and locality, with any observations on habits, attacks by enemies, etc. If an unusual number of any species, appearing travel-worn, should be recorded as occurring suddenly in any district without showing signs of moving on, it would be a fairly certain indication that that district was the objective of a migration, and the butterflies should be found laying eggs.

ON BAOBABS AND RUINS

BY C. W. HOBLEY

In travelling along the coast of East Africa from Vanga to Lamu, groves of baobab trees will be noticed at intervals. The one known to most visitors is that on the south-west side of Mombasa Island, other known examples occur on the north side of Takaungu creek and the north side of Kilifi creek. Upon investigation, I was somewhat surprised to discover that these groves were almost invariably found

on the site of an old ruined town; the frequency of this occurrence seemed to be more than a coincidence, so I cast about for an explanation. After much fruitless enquiry, an old man gave me the following explanation, which is so simple and so probable that I cannot help thinking that it must be correct.

He stated that if the Swahili woman wishes to cleanse her hair she obtains a quantity of the seeds of the baobab¹ and macerates them in water and makes a hair wash.

My informant went on to say that when the women had made their hair wash they threw the seeds out on to the domestic dust heap, and while the town was occupied, of course, if they germinated they had very little chance of survival, for the goats would nibble off the seedlings, but once the place was deserted, owing to war or other causes, the bush would cover the area, and the more recent baobab seeds would germinate along with other plants.

In this case it may be deduced that the age of the older baobabs, if it can be determined, would give with reasonable accuracy the date of the abandonment of the site.

The hard shell which forms the outer covering of the baobab is also used for drawing water out of wells. A square hole is cut out of the side near one end, the seeds and dried pulp are taken out and thrown away, or possibly the latter is used for hair wash, and three or four of the empty shells are suspended on a rope and used for raising water.

This is a collateral explanation of the presence of these baobab groves on old town sites.

There is a current idea that, on account of the great bulk of the baobab trees, they are of enormous age; this belief, I consider, a somewhat ill-founded inference.

The baobab belongs to the mallows (*Malvaceæ*), and the wood is hardly worthy of the name, as it has the consistency of a cabbage stalk, and it is sometimes used for the manufacture of paper.

I endeavoured to count the rings of growth in a medium-sized tree which was cut down in constructing a road; allowing

¹ The flesh of the baobab fruit in which the seeds are enveloped, as is well known, contains a certain amount of tartaric acid, and possibly in the form of tartrate of potash, and it is sometimes used for making a cooling drink.

for two rings per annum, that is, one for each of the two rainy seasons in each year, I could not count more than 220 rings. It was not easy to be certain of the number when one approached the outer circumference, for naturally the rings gradually became thinner as one counted from the centre to the circumference. Assuming that the count was fairly accurate 220 rings would give an age of 110 years, which seemed small for a tree about ten feet in diameter.

Baobab trees are difficult to cut down owing to the spongy nature of the wood and their great girth. During the railway construction it was found that by anchoring one end of a steel rope, taking a turn round the tree and attaching the other end to a traction engine, the rope would cut through the base of the tree. The trouble was, however, not then finished, for the tree just stood where it was, and the rope had to be attached to the upper branches and the tree pulled bodily over. Baobabs are deciduous, they only bear leaves for a very short period during the year, and the remainder of the tree stands as a bare dropsical monstrosity, but even then a grove of them has a charm of its own, and they give a very distinctive note to the scenery of the East African coast, and will be missed when they are swept away to make room for improvements. The great white flowers, some six to eight inches in diameter, are very beautiful in their way, but like the leaves they last a very short time; the young leaves are greatly prized as food for livestock, and slabs of bark are cut from the trees by the natives to make rope and plaited bags. The baobab, nevertheless, appears to have the faculty of healing wounds in its epidermis, however extensive they may be. The fruit juice is also used by rubber planters as a reagent for congealing the latex.

SHELL REMAINS

By C. W. HOBLEY

In some parts of the coastal plain in British East Africa, particularly south of Mombasa, one's attention is attracted to the fact that the ground is strewn with myriads of fragments

of marine shells, and at first sight one might attribute a natural origin to these accumulations, *i.e.*, premising that we had the relics of a raised sea beach ; further enquiry, however, elicits the fact that they are all of human origin, and derived from live marine shells brought up from the seashore and broken up where there was a convenient exposure of old coral reef in order to extract the molluses inhabiting the shells, and which are an article of diet among the Wa Digo, particularly when they are a little short of food. Similar shell deposits are recorded from other countries as left by early man of Neolithic times.

TO THE EDITOR

DEAR SIR,—I must confess to carelessness in handing in my MS. of Notes on Tortoises, in Journal 16, page 50, where ‘ upper shell (plastron) ’ should read ‘ upper shell (carapace) ’. As an opportunity for proof-reading cannot be afforded, the error went to press.

KILOSSA, *June 14, 1921.*

A. LOVERIDGE.

ANNUAL REPORT, 1920

The period under review has been one during which, for financial reasons, the Society has had to curtail its activities, and as a result there is little to report.

Several members of the Committee proceeded home on leave during the year, and as vacancies could not be filled, the Society became more or less dormant. The latter part of the year has been marked by renewed activity, and the position of the Society, both as regards its undertakings and financially, shows marked improvement.

Membership.—The membership has steadily increased, indicating continued interest on the part of the public.

Museum.—No records have been kept as to the number of visitors.

One new forty-drawer cabinet for insects has been installed,

and shelving erected in the workroom, to accommodate the study collection of reptiles.

The entire exhibition collection has been relabelled and additions made. The large labels for the Game Heads were printed gratis for the Society by the *Leader* Office.

Very few fresh specimens have been added, but small collections which had been sent home for identification have been returned and incorporated in the general collection.

Curator.—Mr. Loveridge returned to Nairobi in August, and assumed his duties as Curator at an increased salary commensurate with the increased cost of living. As the Society was unable to promise employment at this increased salary for more than three months, Mr. Loveridge resigned his appointment in order to join the Game Department in Tanganyika.

During Mr. Loveridge's period of office the entire Reptile collection was rearranged and labelled, and the general exhibits overhauled. Mr. A. F. Gedye was appointed to the Curatorship for a period of six months as from November 1.

Publications.—One Journal was issued during the year, and manuscript for the succeeding number sent to the publishers in October.

The cost of publishing the Journal continues to increase, and now stands at about £90. In order to keep the cost within the means of the Society, all illustrations have had to be omitted.

Special Funds.—The Illustration Fund has not received the support it deserves.

A special Curator's Fund was opened, and certain gentlemen have generously contributed thereto.

An unsuccessful appeal was made to Government for funds to meet the cost of the Curator's salary for one year.

Monthly Meetings.—Owing to the disinclination of members to read papers at the members' meetings, no meetings have been held during the year.

Financial.—A statement has been prepared by the Hon. Treasurer and is appended hereto.

V. G. L. VAN SOMEREN,
Hon. Secretary.

BALANCE SHEET

EAST AFRICA AND UGANDA NATURAL HISTORY SOCIETY.
BALANCE SHEET FOR YEAR ENDED DECEMBER 31, 1920.

ASSETS.		EXPENDITURE.
By		
Cash in Bank	Rs. Cts. 1,975·55	To Specimen Case 1,000·00
Fixed Deposits	9,000·00	Cost of Journal 950·00
Messrs. L. Green & Co., Balance of account	236·80	Balance due to Oldfield Thomas 180·69
Advances	214·68	Cash due to Treasurer 12·00
Subscriptions in arrear	1,350·00	Balance Assets 11,084·34
Interest on Fixed Deposits	450·00	
	<u>Rs.13,227·03</u>	

Audited and found correct,
J. TWEELS.

H. C. E. BARNES,
Honorary Treasurer.

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The Journal

OF THE

EAST AFRICA AND UGANDA NATURAL HISTORY SOCIETY

MARCH 1923

No. 18

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ACTING EDITOR OF JOURNAL

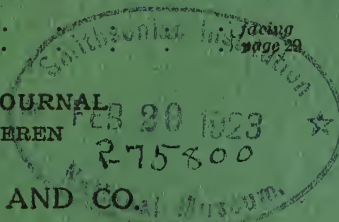
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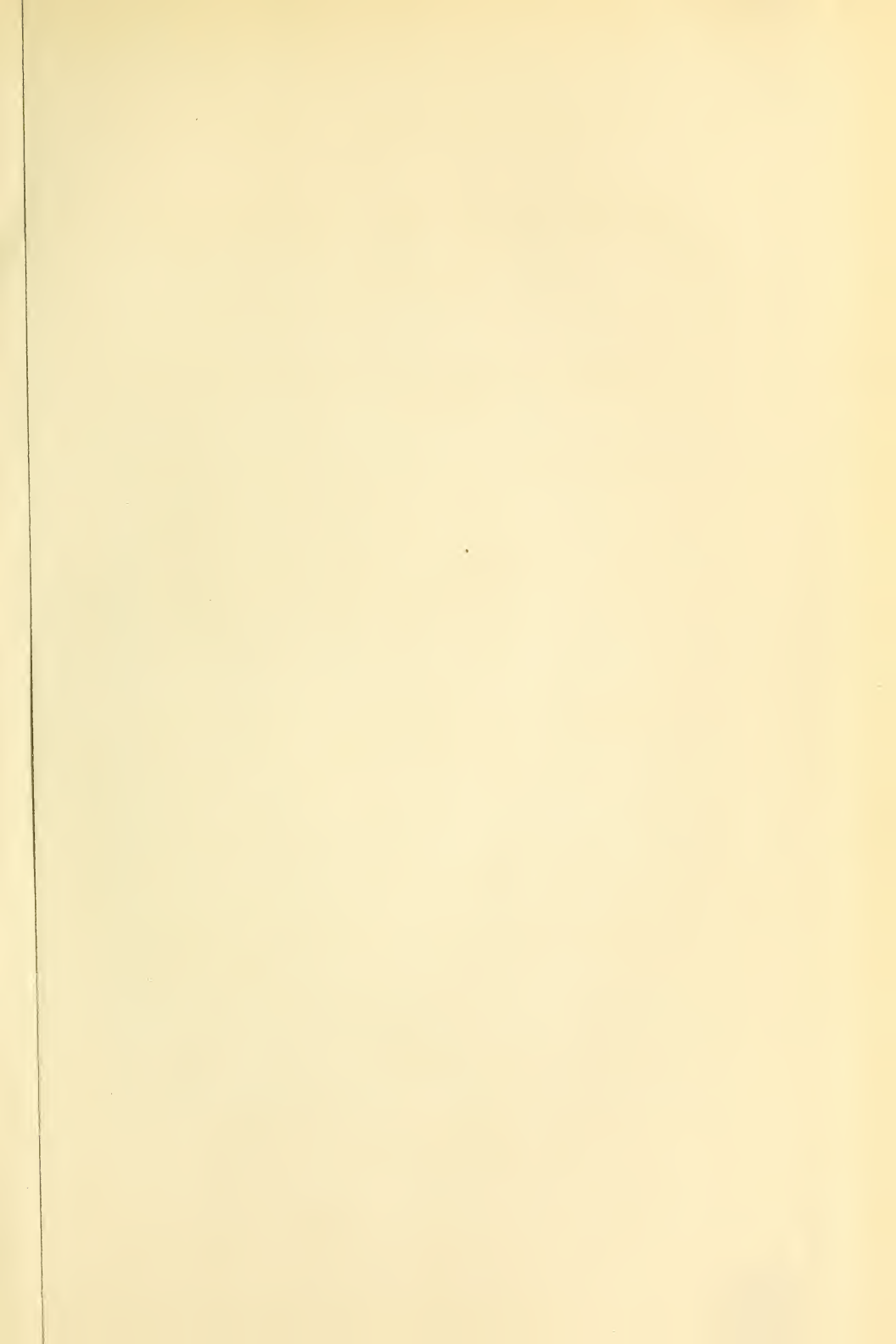
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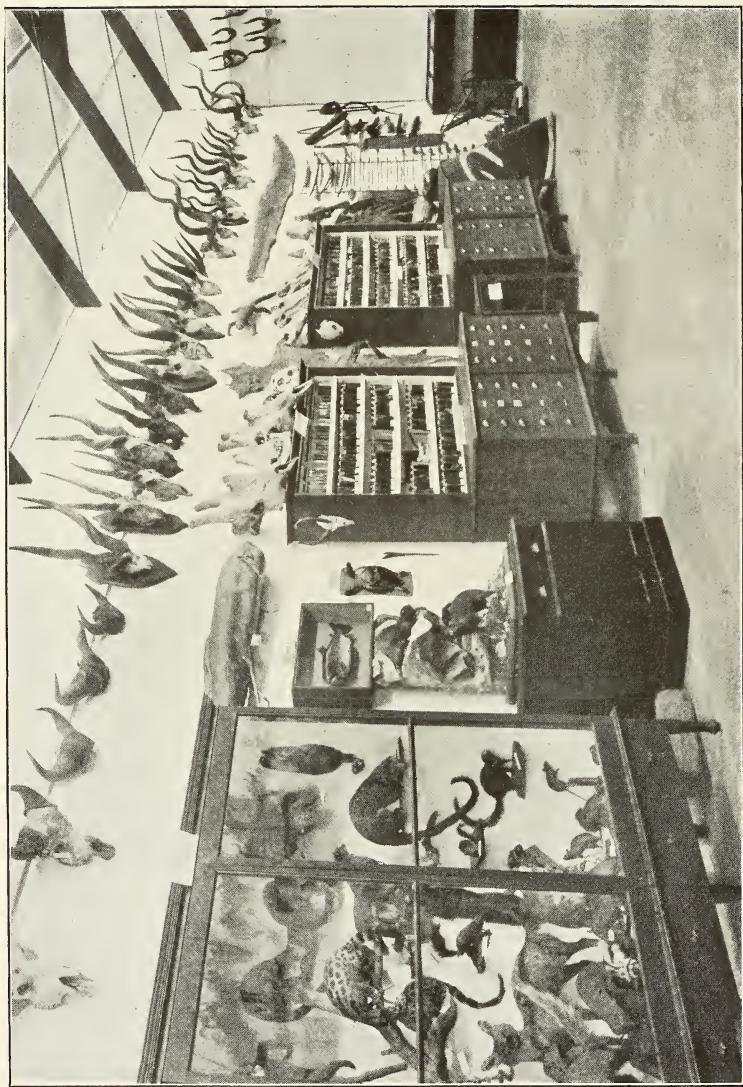
THE NEW MUSEUM, NAIROBI



ENTOMOLOGICAL SECTION



CASES ALONG WEST WALL.



CASES ALONG WEST WALL.

THE JOURNAL

OF THE

EAST AFRICA AND UGANDA NATURAL HISTORY SOCIETY

MARCH 1923

No. 18

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1923

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THE TRIBAL ORGANISATION OF THE NANDI

BY CHARLES HEMSTED

The tribe is divided into fifteen geographical groups.

(1) Kakapoch	.	.	.	.	4 Divisions
(2) Kapchepkendi	.	.	.	.	5 „
(3) Tibiñgot	.	.	.	.	3 „
(4) Kamalilo	.	.	.	.	1 Division
(5) Kaptalam	.	.	.	.	2 Divisions
(6) Koilege or Koileke	.	.	.	.	2 „
(7) Kaptumois	.	.	.	.	3 „
(8) Kapsiondoi	.	.	.	.	1 Division
(9) Kapianga	.	.	.	.	1 „
(10) Kapsile	.	.	.	.	1 „
(11) Kakimno	.	.	.	.	1 „
(12) Cheptol	.	.	.	.	1 „
(13) Kimñgoror	.	.	.	.	1 „
(14) Murgaptor or Murkaptuk	.	.	.	.	1 „
(15) Tuken	.	.	.	.	1 „

Each division has its governing council, known as the Kirwaget-ap-Boriet (the council of the clan). Each council has a president, known as the Kirwagindet-ap-Boriet. The council is primarily a war council, and is composed of the captains of the warrior companies of the various ages, who are called Kirwagik. The present composition of the council is:

The Kiptayen (Captains) of the Kipkoimet age				
„	„	„	Kablaleich	„
„	„	„	Kimmige	„
„	„	„	Nyonge	„
„	„	„	Maina	„

The Sowe age is almost extinct, and the Chuma, the youngest age, is too young to be represented on the council. The Maina, the age below the warriors, are present as Mestowik (apprentices),

4 THE TRIBAL ORGANISATION OF THE NANDI

but have no voice in the council's decisions. Neither the Orkoiyot (the chief medicine man) nor any member of his clan (the Ngetundo Talai) are eligible to become members of this council, but the council communicates with the Orkoiyot, who is never present, through deputies known as Mautiots. Members of the blacksmith's clan are also debarred from joining this council.

In addition to the council of the clan there is a second council, known as the Kirwaget-ap-Amgautiet (the Council of the Gift). This council is composed of two travelling Elders, called Kirwagindet-ap-Amgautiet, who must always be strangers from some other part of the country, and who sit in conjunction with local Elders.

This council deals with all matters relating to property, but is mainly concerned in dividing inheritances. No member of the Orkoiyot's clan or blacksmith's clan is eligible to become a member of, or to be judged by this council.

The Council of the Gift is entitled to receive fees, but the fee is not payable till after the decision has been carried out.

The warriors are divided into regiments, each under a Kiptayat-ap-Boriet (captain of the clan); these are again sub-divided into district companies (Siritiets), each having a Kiptayat as their commanding officer.

Captains of regiments and companies are elected at the Circumcision Festival, which takes place about every four years.

Villages do not exist, but each division is sub-divided into family holdings or parishes, called Korets. Each Koret has its family tree, called the Kokwet, which is the meeting-place of every member of the Koret. Every family tree has its presiding Elder, called the Boyot. The members of the respective Korets are bound together by a bond of brotherhood and share their food, etc., in common, and are bound to aid each other against all enemies.

Huts are of three classes :

- (1) The Kööt (*Kaita* of Hollis).
- (2) The Sigiroido.
- (3) The Kaptich.

The Kööt hut is the family hut, and is occupied by husband,

wife and young children, and sometimes a grandmother. Each wife has a separate hut, which is always built at a distance, often in another part of the district.

The Sigiroido hut is occupied by young unmarried sons. It is a very diminutive hut and is usually built close by the family hut, but with this exception groups of huts are never found.

The Kaptich hut is the cattle kraal hut, and is built on the grazing grounds far from the family hut. It is occupied by warriors and girls of several families, as a number of families usually club together and keep their cattle at the same Kaptich. A Kaptich will usually contain from 50 to 150 head of cattle.

Widows with grown-up sons usually occupy the same hut.

The grain store is called Chorget. This is a small hut built on piles close by the family hut. Grain is always stored in the ear and not threshed till required for food.

NAMES AND AGES

The Name

Every Nandi, whether boy or girl, is given a birth name.

Examples of boys' names :

Toimur

Kipchoge

Examples of girls' names :

Tabune

Chesaina

These names are retained till the boys reach the warrior age or the girls are married. The birth name is then dropped and the father's name adopted—thus Toimur becomes arap Kibe (the son of Kibe) and Tabune becomes chebochok Kimai (the daughter of Kimai).

The sons of arap Kibe when they reach the warrior age and drop their birth name will take the birth name of their father and become arap Toimur, and similarly his daughters would become chebochok Toimur.

A woman does not adopt her husband's name when she marries.

Widows with sons adopt the names of their sons.

Example : Kobot Kiprono = The mother of Kiprono.

The sons of widows will always bear the husbands' name, even though they may be born many years after his decease.

6 THE TRIBAL ORGANISATION OF THE NANDI

Instances will be found in which men who have passed the warrior age are known by a name instead of as the son of So-and-so; the reason of this is that they have had a particularly illustrious ancestor, usually a grandfather, whose memory it is desired to perpetuate, and whose birth name is adopted. In such cases the name takes the prefix 'Kap' and the suffix 'in.'

Examples :

Kapsegoin (the descendant of Sego)

Kapkunoin (the descendant of Kuno)

Birth names are usually taken from some ancestor, and it is alleged that the shades of ancestors frequently appear to pregnant women, and when this is the case the name of the particular ancestor whose shade appeared is given to the child.

A woman may never mention her husband's name, and similarly a husband may never mention his wife's name.

The following are examples of men's names :

Kimoge	= large navel.
Kiptot	= born in the <i>totet</i> room of the hut.
Kipkoech	= born just before sunrise.
Kibegele	= front teeth missing.
Kipchobong	= a clever child.
Kiptum	= born at the circumcision time.
Sigawa	= from the <i>sigawet</i> tree.
Kibelat	= born when lightning is flashing.
Kipchirchir	= born in the shamba when the <i>wimbi</i> or eleusine grain is being cut.
Kibee	= born in the cattle boma.
Sambai	= born of a mother who begs food.
Kiptalam	= born when the locusts are about.
Matinyit	= cut ears.
Kipkatam	= left-handed.
Kibomet	= large head.
Baigong	= almost still-born.
Kiboit	= large ears.
Kimnet	= born when the cattle have gone to the salt-lick.
Kipkessia	= born in famine time when unripe corn is being ground.

Kiprono	= born when the goats return to the hut.
Melgut	= one who licks his lips.
Maritim	= named whilst still in embryo when father dying, so that he may not die childless.

The Age

Age is not reckoned in years as with us.

The following is a list of the ages or cycles and corresponding warrior companies :

Age or cycle (<i>ipinda</i>)	Company	Approximate age in years of a member of the cycle
Sawe . . .	Chonginiek . . .	77 to 81
„ . . .	Oldarangu . . .	73 „ 77
„ . . .	Kiptoitu . . .	69 „ 73
Kipkoimet . . .	Chonginiek . . .	64 „ 68
„ . . .	Oldarangu . . .	60 „ 64
„ . . .	Kiptoitu . . .	56 „ 60
Kablaleich . . .	Chonginiek . . .	51 „ 55
„ . . .	Kibolgon . . .	47 „ 51
„ . . .	Kiptoitu . . .	43 „ 47
Kimmige . . .	Chonginiek . . .	38 „ 42
„ . . .	Kiptaru . . .	34 „ 38
„ . . .	Tetagat . . .	31 „ 34
Nyonge . . .	Chonginiek . . .	26 „ 30
„ . . .	Taparit . . .	22 „ 26
„ . . .	Kiptoitu . . .	18 „ 22
Maina . . .	Not yet named . . .	13 „ 17
„ . . .	„ . . .	9 „ 13
„ . . .	„ . . .	4 „ 9
Chuma . . .	„ . . .	0 „ 4
„ . . .	Not yet born . . .	— —
„ . . .	„ . . .	— —

These ages are a perpetually recurring cycle.

RELIGION

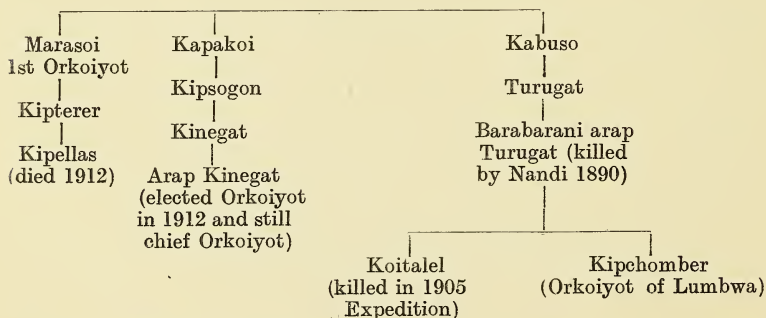
The religion of the tribe is ancestor worship. The dead are known as the Oiik and are believed to reside under

the earth with their cattle. The shades of the dead walk the earth and watch over the living and protect them from injury. There are bad shades who destroy the living and the cattle in order to obtain possession of them. The shades appear to pregnant women at night, and the child when born is believed to be the shade reincarnated and bears its name. Prayers are frequently made to the dead.

Some five generations ago the tribe decided to adopt a religious head through whom intercession could be made to the ancestors in time of sickness, famine, etc. They accordingly sent a deputation to the Masai and obtained from them a man named Marasoi, who became the first Orkoiyot. The name seems to mean the attendant of the ancestors. Marasoi was quickly followed by two others named Kapakoi and Kabuso, and all three were in office at the same time, but in different localities. The office of Orkoiyot has since become hereditary, but through the three lines of ancestors, and falls to whichever line has a representative of an age and intelligence to fill the office.

GENEALOGICAL TABLE OF THE CHIEF ORKOIYOTS OR LAIBONS

A Masai clan tracing its descent through the Sikilai, the former inhabitants of the Uasin-Gishu belonging to the Ngetundo sub-clan (totem lion) and the Nandi division of Talai.



The Orkoiyot lives the life of a recluse and is rarely seen. His principal function is to advise on the prospects

of a war or raid and to prepare medicine for the warriors. As previously pointed out he is waited on by deputies from the council of the clan called Mautiots, and through them gives his advice. The office is in no way an executive one. In addition to the Orkoiyot every member of his clan, the Ngetundo Talai—that is all the descendants of the three original Orkoiyots—is believed to possess occult powers, including the power to call down lightning to strike people and to bewitch them or their cattle with a look or, as is most frequently done, by placing the hand of an ape in the hut. Their numbers were formerly kept in check by periodical killings, but as this has had to be discontinued for the past twenty years the tribe is now in a quandary as to what to do with its witch-doctors, who have increased beyond what are considered reasonable numbers.

No member of this clan is eligible to become a member of any native council or to be judged by one.

DOCTORS AND WITCH-DOCTORS

The Chepkerichiot.—The Chepkerichiot corresponds to the ordinary medical practitioner. Both personally attend either males or females, except midwifery cases, which are always attended by the female doctors. A fee is charged, but is not payable unless or until the patient recovers. The medicinal properties and preparation of plants and herbs are secrets handed down from father to son or mother to daughter. Medicine is always disguised before being given to the patient, so that the secret may be kept.

Bleeding, cupping, bone-setting, and other minor operations are practised by the Chepkerichiot, but in the case of major operations a specialist is called in from the neighbouring tribe Nyangori. These specialists perform operations of some magnitude.

The Kipsargaiot ♂, the Chepsargaiot ♀.—The Kipsargaiot are usually consulted when the Chepkerichiot has failed or when witchcraft is suspected. They never attend the patient personally nor do they prescribe medicines. They discover the nature of the disease by a sense of smell or

some form of divination, and name the man or woman who has cast a spell or bewitched the sick person. They remove spells by incantations and can call a curse. They also deal largely in charms. They may be either males or females.

The Kibomut.—The Kibomut is usually consulted after both the Chepkerichiot and Chepsargaiot have failed. When application is first made to him he casts stones in a drum or hollow tube and from these divines if the sick person is suffering from witchcraft. He then vaguely indicates the witch by some such description as a light coloured woman, a stranger, living on the other side of a river with one child.

He then goes to the hut of the sick person to pick up the scent, and from there follows the scent running round the country sniffing like a dog and holding a piece of wood, known as *labotwet*, in one hand and a knife in the other. As he runs and smells he digs the knife into the ground, and produces articles such as jackal's claws, hair, and insects.

After this exhibition he follows the scent to various huts, where he is usually bought off with a goat, till he finally runs the trail to the witch. The witch is then taken by the relatives of the sick person to his hut or to the family tree. Stakes are planted in the ground and a bow string is passed round the witch's head, the ends being made fast to the stakes on either side. She is then beaten by the relatives of the sick person, whilst the Kibomut prepares water and herbs with which he washes the sick person. If she lives through the ordeal the witch is then allowed to go free.

In some instances the women are assembled and placed in a line at the meeting-place of the parish or clan, and the Kibomut runs round them, smelling, till he has located the witch.

The Kipiserget.—The Kipiserget is a class of doctor whose business it is to make barren women bear children. They do not belong to the Ngetundo Talai (the wizards' clan). They are probably ventriloquists, and their procedure is to beat upon a gourd and raise the spirit of an ancestor. The ancestor then speaks from the gourd and advises the woman what she should do in order to become pregnant.

MARRIAGE

Marriages are performed by a priest called the Moteriot. The ceremony consists in placing a ring of grass round the wrist of the bridegroom and a similar ring round the neck of the bride, after which the priest pronounces them man and wife. Other ceremonies follow, but this is the one and only binding act. This marriage is binding for life. Even in the event of the husband's death the widow can never marry again.

The qualifications required of a Moteriot are that he must be a good singer and have a large family.

The marriage price is a matter of agreement between the parents. The ordinary price is one heifer, one bull, and from two to six goats. The progeny of the heifer may or may not be returnable to the husband's family, according to the contract made. The marriage price is not payable till some five or six days after the marriage has been consummated.

The marriage price is returnable in the case of a woman who dies before she has borne a child.

Marriages between women are not uncommon; thus a widow who has borne only female children will seek out another woman and propose marriage to her. She pays as the marriage price the cattle which she has received as the marriage price of her own daughter; a form of marriage is gone through in which, amongst other ceremonies, their heads are bumped together to make them agree, and from that time the two women occupy the same hut and become 'man and wife.' The 'man' exercises all the rights of a husband, and may make the woman work for her. Any children which the woman may subsequently bear become the 'husband's' children, and will inherit the progeny of the cattle she has paid. If the woman does not bear children, at her death the 'husband' is entitled to the return of the dowry paid for her.

Widows may never remarry.

The *moterenik* sing: *moteriot* are the elders who organise the circumcision ceremonies.

INHERITANCE

Property is of two classes :

- (a) Inherited property. (b) Acquired property.

Inherited property passes first to the brothers of the deceased and, subsequently, to his sons. Acquired property passes direct to the deceased's sons.

The Chemūs Cow.—This is the first charge on the property of the deceased, and goes to the person who removes the body of the deceased from the hut and lays him out in the bush.

Law of Inheritance.—The law of inheritance is that every male member of a family must inherit a female animal from each cow family as successive generations of cow calves are born. In the case of inherited property, the eldest brother takes the first parent of the cow family and the youngest brother the parent of the second cow family. Parents of cow families are then allotted to intermediate brothers. As successive generations of cow calves are born, the calves pass in successive generations through each of the brothers, till each possesses a female animal from each of the parent cow families. Second calves from the same parent cow pass to the sons of the deceased.

Bull calves are ordinarily retained by the owner of their mother, but in the case of a poor family two would be exchanged for a heifer and its progeny divided as above.

Acquired property is divided in a similar manner amongst the sons, instead of the brothers of the deceased. The eldest son usually takes charge of all the cattle till the youngest son is of an age to inherit when the cattle are divided.

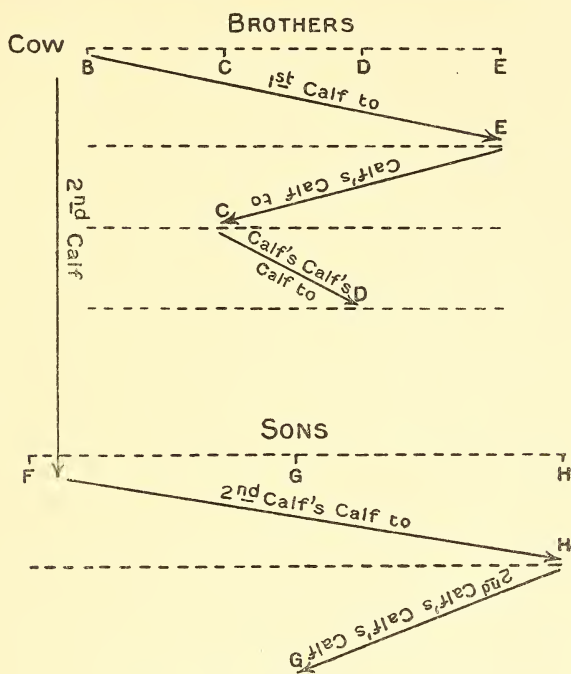
The diagrams shown on pages 13 and 14 give examples of inheritance. It will be observed that an exactly even division of cattle is thus brought about.

The odd cow is usually herded by a stranger and is not allotted till a calf has been born from it for each member of the family.

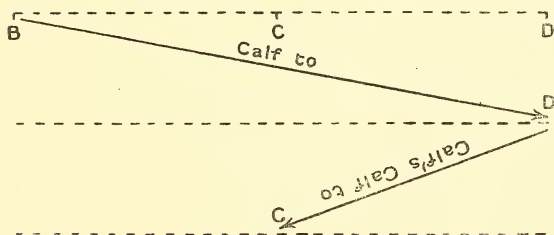
Instances have occurred in which headmen and others have acquired property to which they had no valid title. They have

THE TRIBAL ORGANISATION OF THE NANDI 13

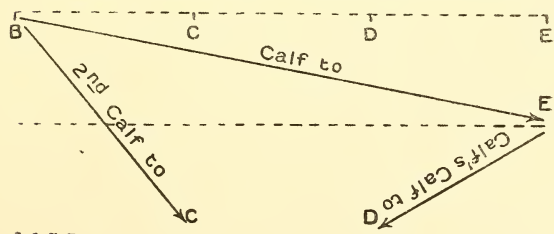
A. leaves 1 inherited cow, 4 brothers, and 3 sons.



A. leaves 1 head of acquired cow families and 3 sons.

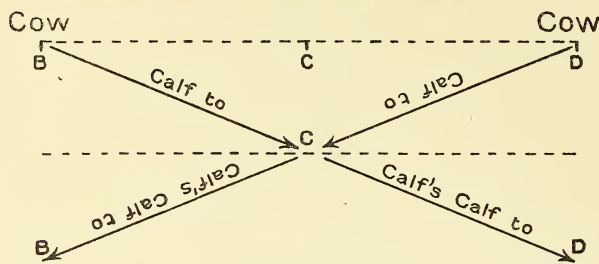


A. leaves 1 head of acquired cow families and 4 sons.

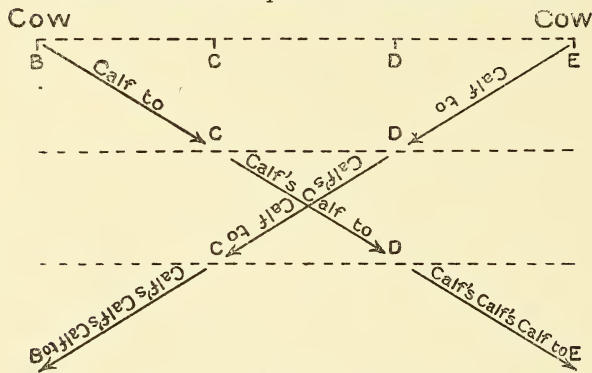


14 THE TRIBAL ORGANISATION OF THE NANDI

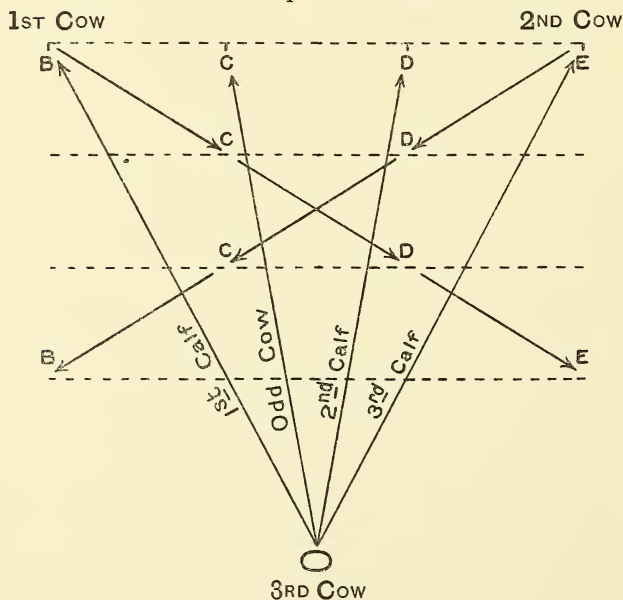
A. leaves 2 head of acquired cow families and 3 sons.



A. leaves 2 head of acquired cow families and 4 sons.



A. leaves 3 head of acquired cow families and 4 sons.



enjoyed the use of the cattle for their lifetime, but at their death all have passed out of their family to the family of the original owners through this system of division.

The Chemwai Cow.—The Chemwai cow is the cow paid as a marriage price. Often it is given to a son during his father's lifetime, so that he may purchase a wife. The progeny of this cow is a matter of bargaining in the marriage contract. If the father of the bridegroom is a rich man it will probably go to the bride's family in perpetuity, but if he is a poor man, arrangements will be made that its calves will revert to the bridegroom's family, passing through each member in successive generations of calves.

THE WIDOW'S DOMICILE

The following opinion was given by the leading elders when acting as assessors in a criminal cause :

When a man dies his property will be divided. His widow will obtain her share. It will remain her own personal property up to the time of her death. It is probable that she will require it for the purpose of contracting a 'marriage,' or 'female alliance,' with another woman, by whom she may have children (*sic*). In this case she would live with the woman she had married and enjoy the same freedom of domicile as a man.

If no such 'marriage' is contracted, and her husband has a brother living, she should go to live with him. If no brothers are living, and she has no children, she should go to live with the children of her husband by another wife.

If the widow is of opinion that she may suffer in property at the hands of her husband's relatives, she may return to the place where she was born ; there she must choose a man of the totem of her husband's family, and he must visit her as a stranger.

No person has the right to seize a widow's property by reason of the fact that she has made default in her domicile.

AFRICAN SIGN-WRITING

BY C. W. HOBLEY, C.M.G.

The early origins of written script have afforded great interest to inquirers during the last century or so, and the general failure of African races to originate and develop written languages is a point which affords some thought, especially when we consider the faculty they have demonstrated of developing such a wealth of oral language. Possibly, however, if written script had been invented, its existence would have checked the numerous variations in language.

I have for some years recorded any instance of sign-writing which came to my notice, and my interest in the subject was reawakened by some notes by Prof. K. Weule, which were picked up in German East Africa and sent to me by one of the officers of our expeditionary force. I propose to quote herein some of the examples which he mentions. His premise is that the origin of all writing was the marks made on rocks by early man, and that these markings, which were mostly geometrical, were first inscribed without any ulterior object—i.e. merely for amusement—but later on individuals of more ability used them to convey some meaning to another person. This may or may not be. I should be inclined to doubt whether early man went to the trouble of incising marks on stone for mere amusement. The whole question, it appears to me, is bound up with the dawn of decorative art, which probably commenced on the human body, and at a very early date branched off into pictorial representations of the animals of the chase, *vide* the wonderful paintings made by men of the Magdalenian era in the Altamira caves in Spain and elsewhere. I would postulate that sign-writing presupposes articulate speech, and a certain development of the art of ornament.

In South Africa a wealth of rock paintings have come to light, and also a large number of incised figures on rock surfaces—petroglyphs, as they are usually termed.

Thus, incised figures are believed to be of earlier date than the paintings.

Many of the figures are lifelike reproductions of the large fauna of the country, viz. giraffe, elephants, buffalo, antelopes, etc. Other markings are mere copies of the spoor of various animals, and some think that these were cut to indicate to their friends the presence of certain species in a particular locality; this is doubtful, as, judging by present-day hunting tribes, they depend entirely on the actual recent spoor, and naturally too, for a sign on a rock that an elephant was seen at a certain place some months before is of little value to a hunter. These signs are more likely to be cut as a mark of thankfulness to the spirit which has assisted the hunter in a successful chase.

As the learned professor points out, two well-known classes of signs in use at the present day are locality marks and property marks, and as regards the former, he points out even to-day how the various touring clubs paint coloured patches on trees at intervals along a road to guide persons along a particular route. The Automobile Association signs belong to the same class, and also the universal delineation of a human hand, with the index finger extended in order to point to a passage or door. In Africa it is the custom for the guide of a caravan of porters, when the path divides, to close one branch by scoring lines on the ground, or by breaking off a few leaves and strewing them on the path which is to be avoided. In Kavirondo the grass on each side of the path will be sometimes knotted across the branch to be avoided, and if the path is indistinct, knots will be tied in the grass alongside a path to reassure the people who have lagged behind that they are on the right road.

In some places a pile of stones will be observed by the side of the road, or, again, stones will be seen in the cleft of a tree by the roadside, and it will be noted that some natives will stop and add a stone to the pile; this custom has a different origin, and is usually done to propitiate a spirit which is believed to haunt the spot. The native argues that it is not much trouble to add a stone; there may be nothing in it or,

again, there may, and in these matters it is just as well to be on the safe side—you never know !

On an escarpment a few miles to the east of Naivasha there is a large heap of stones by the path, and the Masai used to tell one that a great chief of old time was killed there, and if a man was travelling from the Kinobop plateau to Naivasha, he generally reached there near sundown and the votive addition of a stone would delay the sunset a little, and enable him to reach the Naivasha settlements in safety before darkness overtook him. This, I take it, is an interesting example of how increase of potency will often accrue to a shrine.

To revert, however, to our signs : it is said that among the Ewe people of Togoland if a person calls on a friend and finds him absent, he will pull a little grass from the roof of the hut and attach it to a stick placed outside the door, to let the hut owner know that a visitor has called.

Sheane (' Great Plateau of N. Rhodesia ') tells us that the A-Wemba hunters make certain marks on their arms to record the number of the bigger animals they have killed, and in some parts of Kavirondo the birth of each child is marked by a little extra cicatrisation on the abdomen ; these marks may however have a magical origin.

As regards property marks these are common in Africa ; the cattle markings of the Masai and A-Kamba are well known, and in the Sudan there is an elaborate system of camel marking. Weule gives examples taken from Merker's book, ' Die Masai,' showing the clan markings of three of the divisions of the S. Masai (see Fig. 1). Merker also states that the arrow and shaft heads of the arrows of the ' moru ' (the married men) are also marked. The marks, if any, on the midrib of the shield are merely ornamental ; the main feature is the clan mark, and in addition there are occasionally a personal mark at the side, which in the old days was generally added by permission of the ' ligwanan ' as a sign of personal bravery.

Some allege that a mark is added to denote to which company the warrior belongs. I, however, have not identified any such mark.

Weule alleges that beehives in Kikuyu are marked with a kind of trade-mark placed on them by the maker. According to my information, however, this is not usually the case; beehives in Ukamba, also those belonging to the Dorobo of

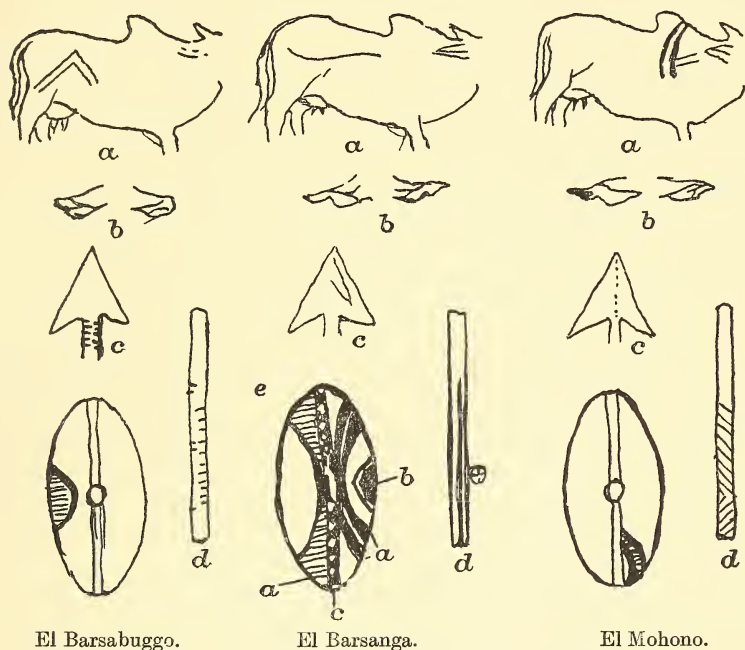


FIG. 1.—Cattle and weapon marks among Masai.

(a) Cattle brands of the three clans above enumerated. (b) Ear marks on live stock of same class. (c) Marks on iron points of arrows. (d) Marks on detachable wooden shaft to which the iron arrow point is attached. (e) Patterns on the shields: (a) War mark (according to Weule); I have always been informed that these are clan marks. (b) Personal marks, generally awarded for bravery or other particular reason. (c) Merely ornamental.

the forests of Kenya and the Aberdare Range, bear a clan mark, and sometimes a personal mark. This is a sign of ownership, and is done as a warning to pilferers, the rifling of the honey from a beehive being looked upon as a very grave offence by African tribes.

Knots on a string are sometimes used by natives as aids to memory, especially in keeping a tally of people who had

to pay their hut tax, and as a record of debts of cattle. A Kavirondo once came to me to crave assistance in recovering an old debt of cattle dating back for a considerable number of years. He had a big basket with him, and he sat down and gradually unfolded his tale of woe. He first produced a couple of artistic models of two head of cattle fashioned out of black clay; these represented the original loan. He then produced over twenty smaller models; these represented the progeny of the original pair, and his claim was for the total.

Weule states that the fetish priests of Isa at Atakpam in Togoland use small strips of bark as writing material; on these they incise marks with a knife; he gives examples (*vide* Fig. 2 *a*, *b*, and *c*).



FIG. 2.—Communication in sign code used by priests of Isa at Atakpam, Togoland.

(*a*) is said to represent a case of a young priest who asks an old priest what he is to do for a sick man who wishes to know if he will recover.

(*b*) is said to contain the answer of the old priest, which is to the effect that the suppliant must kill a goat and offer it to Isa and he will then recover.

(*c*) is said to represent two men who, as a sign of their friendship, divided a piece of cloth in two. According to the rules of the cult they have to offer it to the priest of Isa, the penalty for refusal being the death of both on the same day. In the case cited it is said that they refused and did die on the same day.

As Prof. Weule says, probably the priests saw to it that they did die, in order to maintain belief in the strength of their cult.

Cases are also quoted of objects being used as a sign to express the power of a chief or ruler. In Dahomey the

king is said to send a staff round to call a meeting, and the people show it the same reverence as they would to himself. The late Masai laibon, when he despatched an order to any of his people, used to send a messenger with an iron club, and it was at once known that the message was *bona fide*.

In Kavirondo there lived a powerful rain maker named Mgahanya, and if the rains were a little overdue he sent out a spear by one of his men. This spear was planted in a village, and was a sign that the rain would be withheld until that village paid an ox; the ox was invariably paid, and the spear was then moved on and planted in another village. A similar instance is quoted by Sheane, as to how the Wemba chief would send a messenger with a spear to the chief of a neighbouring tribe as a token of war unless the annual tribute was paid forthwith.

Schweinfurth relates that when the Azande or Niam Niam tribe were having trouble with a neighbouring tribe they placed a maize cob and the feather of a chicken on a post by a path near the boundary; this sign was equivalent to a challenge, and the removal of these objects meant a declaration of war.

In East Africa, in the early days of the Arab traders, if a party arrived at the boundary of a tribe whose attitude was uncertain, the caravan was halted and some of the elders were induced to come to a conference; they asked the object of the stranger's visit and a palaver took place. At the close of the speeches on both sides, it was a common custom to lay down between the parties two or three arrows on one side and some trade goods, cloth, or wire. Beads would not be used at a ceremony of this kind. The elders would then be asked to choose; if they took the cloth it meant that the caravan would be peacefully received; the next step would then be to request them to tell their women to bring food for sale. Once the women appeared the travellers knew that the peaceful decision would be ratified.

The Yoruba of the West Coast, it is said, also use objects to express meanings: two snails facing each other on a string means friendship, and if placed with their backs to each other it means enmity.

Two snails and a feather means 'I wish to see you : come as quickly as the bird flies.' A stone means either hard, strong, or helpful.

A piece of charcoal means black, downhearted and miserable. Red peppers mean biting-hot, also curiosity. A rag means upset and distressed. A dried-up bit of corn means suffering and pain.

A collection of such objects sent by a prisoner to his wife is said to read as follows : 'My body is as strong as this stone ; my future outlook is as black as this charcoal ; my body will dry up as this corn from suffering ; I look like this rag.'



Fig. 3.—Face of Ekoi girl with Nsibidi marks.

Weule writes that some natives send one of the sticks they use for tooth-brushes to a friend, the idea being that the sender would be as unlikely to forget his friend as he would forget to clean his teeth.

Meinhof records that the chiefs of Ewe in Togoland send each other complimentary presents of gourds upon which proverbs and tribal sayings are illustrated by signs intelligible to both parties. If this is so, we are here approaching the stage of ideographs.

In vol. xli (1911) of the *Royal Anthropological Journal* I published an account of certain Kikuyu minstrels who sang to certain *motifs* depicted by signs on a gourd, a practice which reminds one of the Togoland example.

Sheane records that some of the tribes with which he came in contact possessed a code of signs or gestures for conversing with deaf mutes. Is it possible that the conventional delineation of such gestures forms the beginnings of a sign language or the converse? It would also be very interesting to know if the signs or gestures represented words and ideas, or whether they spelt out words letter by letter as we do.

Symbol writing representing proverbs is also said to be found among some tribes in the Congo, but I have no details.

Considerable attention has been attracted to what is

called the Nsibidi writing of the West Coast. Macgregor states that it originated among the Ibo tribe, but Talbot, a more recent student, attributes its origin to the Ekoi people. Macgregor states that it is a writing, the complete key of which is only possessed by a native secret society. Talbot, however, alleges that among the Ekoi, girls and women have these signs painted on their faces, and that these symbols record incidents in their lives. Fig. 3 is a reproduction of a face so painted.

It is said that simple communications are conveyed by marks in the sand, or by paintings on a wall.

The examples shown on p. 24 (Fig. 4) are given by Talbot.

(1) Said to represent a married couple belonging to the Egbo tribe, which is indicated by the feather.

(2) Married affection; the star is said to indicate a true heart.

(3) Quarrel between husband and wife; they have turned their backs to each other, and have placed a cushion between them.

(4) A trader has arrived with native money at a place where the roads fork. The currency consists of brass wire bent into the shape of a horseshoe; these are locally called 'manillas.'

(5) A main road with a lot of traffic.

(6) Symbolises much wealth; five of the so-called 'manillas' are depicted in concentric fashion.

(7) Darkness.

(8) Hunger; it is supposed to represent a man pointing at his stomach.

(9) Said to represent two witnesses contradicting each other; the straight line is the man telling the truth.

(10) Two quarrelling women; the stars are said to indicate the words spoken. The American Indians are alleged to use the same sign for words.

(11) A man who talks too much.

(12) A man lying ill in his house; he has three visitors.

(13) This is said to be a reproduction of a court case.

(a) Is the court.

(b) Sitting man, witnessing the trial.

NSIBIDI SIGNS.

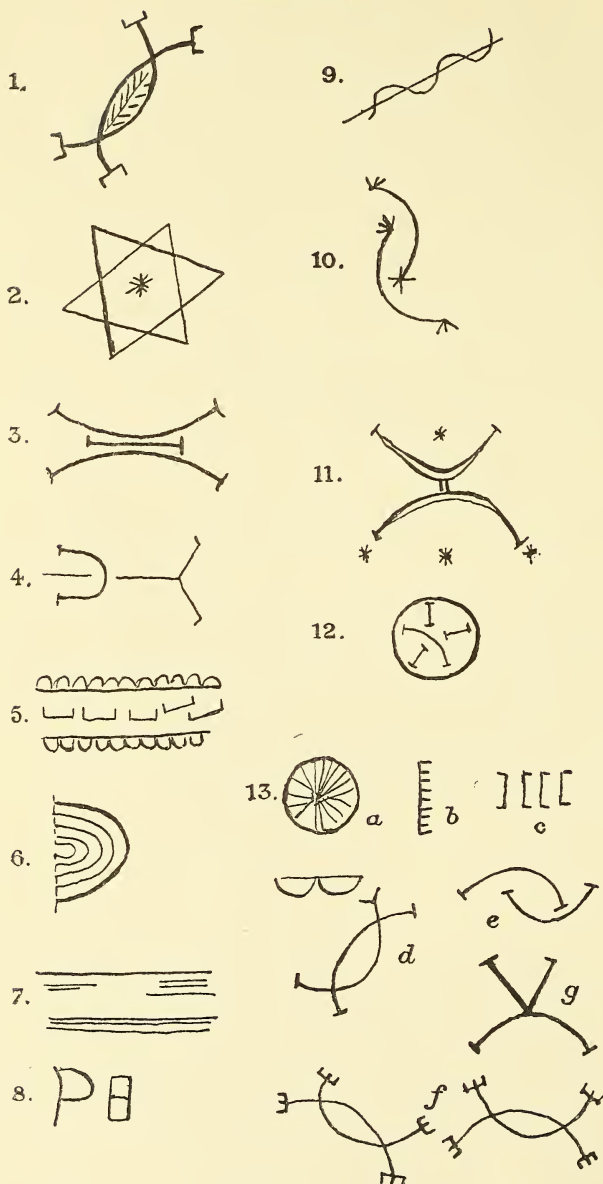


FIG. 4.

- (c) Men standing outside.
- (d) The accused. On the left, at the top, a fetter with which he is secured. The sign used for the man is said to indicate that the charge is adultery.
- (e) That the accused is a dissolute fellow.
- (f) Said to represent evidence of previous similar offences.
- (g) Represents a man who is present, and who states that he has nothing to do with the case.

(See also paper by E. Dayrell, J.A.I. vol. xli.)

Other sign languages of a somewhat similar character are recorded from the Wey tribe on the coast of Upper

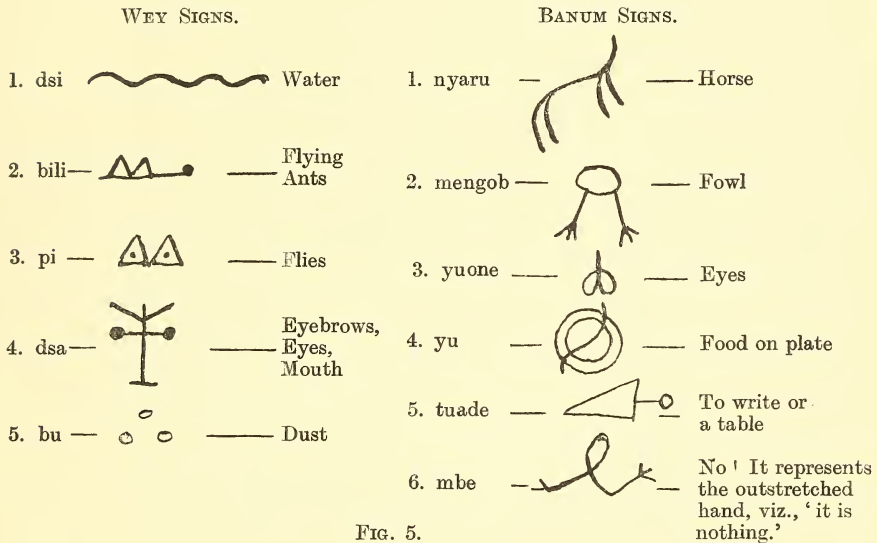


FIG. 5.

Guinea and the Njoja tribe of Banum in the Cameroons. The former is said to have been invented by a man of the tribe as recently as 1834, and Weule considers that it was suggested by the writing of Europeans and Mohammedans.

A few examples are given in Fig. 5.

Like Egyptian hieroglyphs and Chinese ideographs these primitive attempts at conveying thoughts by marks are ideographic, and it therefore appears certain that the mind of primitive man and the savage of to-day work in the same

manner, and that in neither case did written language commence with the invention of an alphabet. Further, it seems certain that ideographic writing cannot survive alongside languages recorded on an alphabet basis, for ideographs fail, to a great extent, in the expression of abstract ideas. The Greek alphabet killed the Egyptian hieroglyphs; and the cumbrous Chinese so-called alphabet, which is ideographic, has, I take it, only survived owing to the long isolation of China. As regards these poor African attempts, they are, of course, doomed to early extinction as elementary European education spreads among the tribes.

The invention of accepted symbols to express the various vowel and consonant sounds of which words are composed was one of the greatest discoveries mankind has made.

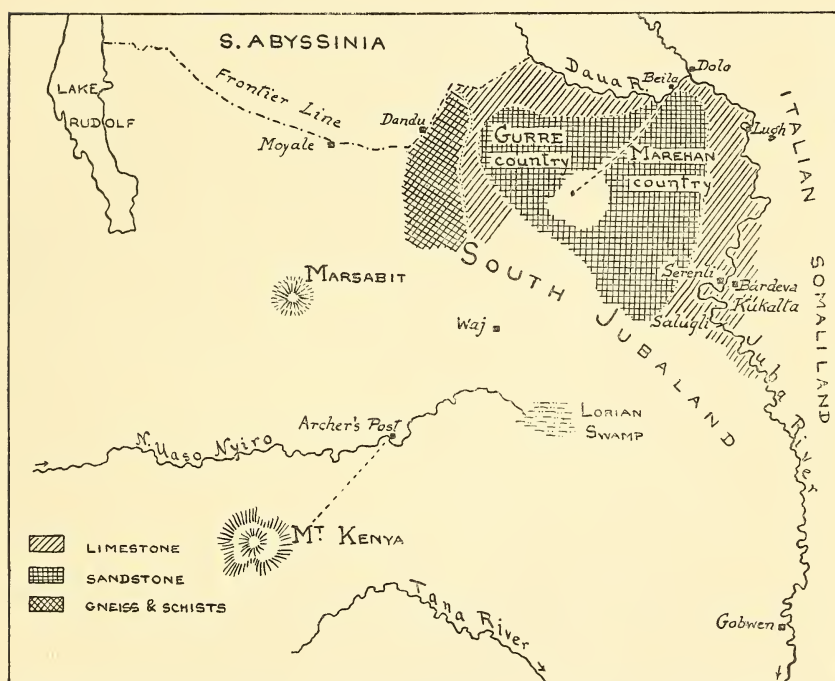
Consequent upon this discovery was the expression of musical tones by conventional signs, which was another great stride in mental development, and without which music in its modern sense could not exist.

Much research is still needed in regard to the birth and early development of written language, and it is to be regretted that black Africa does not appear to provide evidence of a more advanced nature than it apparently has up to date. Even with the well-known established languages there are so many questions one asks oneself: Why, for instance, are the languages of the European group written from left to right, whereas Arabic and Persian are written from right to left? And even here there is an inconsistency, for Arab numerals are written from left to right as ours are. Can it be that they borrowed their numbers from the West? Why, again, should the Chinese write in vertical columns? More information, however, undoubtedly remains to be collected, and no opportunity should be missed by residents among tribes which may, as yet, be comparatively untouched by European influences.

A SHORT ACCOUNT OF THE SEDIMENTARY ROCKS FOUND IN THE NORTHERN FRONTIER DISTRICT —KENYA COLONY

BY V. GLENDAY, M.A., F.G.S.

The Northern Frontier District proper comprises the country which lies between the left bank of the Northern Uaso Nyiro and the Abyssinian Frontier stretching east-



wards from Lake Rudolf through North Jubaland to the Juba River.

This somewhat remote and turbulent area is of great interest geologically, containing, as it does, Lake Rudolf (part of the eastern arm of the Rift Valley), the great Archean complex of gneisses and schists which form the Abyssinian

escarpment proper, and the volcanic mountain of Marsabit with its circumambient plains of lava.

Not the least interesting feature, however, is the great development of sedimentary rocks which have been found to exist on the eastern portion of the district, and to stretch south-eastwards towards the sea, disappearing before reaching the latter under the alluvial plain of South Jubaland.

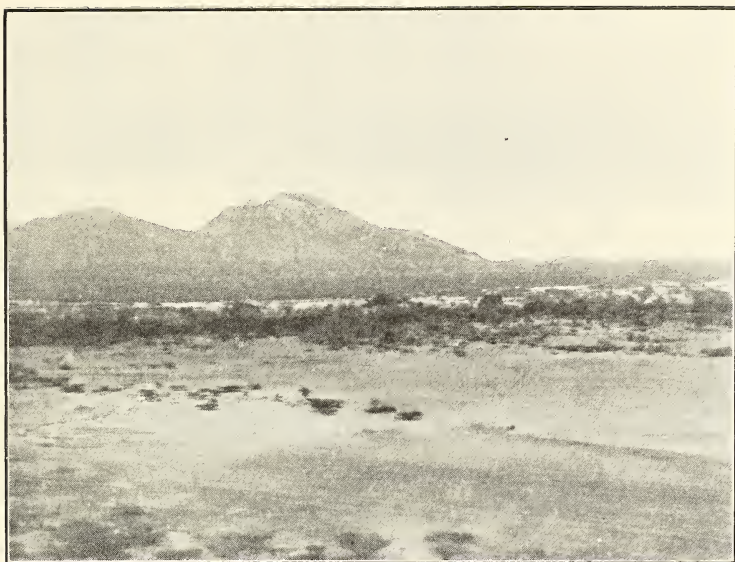
As one of the first persons to have the opportunity to study this series, it is my intention to try and give a short account of their extension and mode of occurrence. As, however, all my field notes and specimens are at present in England for the purpose of identification and detailed study, it will be remembered that this account can only be of a general descriptive tentative nature.

To an observer standing on Dandu, one of the eastern points of the Abyssinian escarpment, and looking southwards, a very striking contrast in scenery is noticeable. To the west are to be seen the characteristic 'monadnockic' hills of gneiss jutting out of the bush-clad plains, whilst to the east a low, gently undulating scarp is observed, behind which the country dips gently to the S.E. The latter is approximately the western outcrop of the sedimentary rocks, and occurs on the western section of the Gurre country.

The rocks can be easily divided into a limestone and sandstone series, both of which are generally flat-bedded or dip gently to the S.E.

THE SANDSTONES

These are massive and fine-grained, of a deep reddish colour, showing occasionally striking patterns of bands of colours varying from black and purple to a light ochre. This is very noticeable at Dakka Dima (meaning red rocks) on the W.N.W. of Eil Wak. They suggest an origin from the decomposition of the ancient gneisses and schists. The sandstones stretch as a broad band across the Gurre country eastwards to the Juba River, thickening to the N.E., but they do not outcrop northwards on the Daua River until Beila is reached. Southwards they extend below Serenli and seem to disappear N.E. of Salugli.



BUNA : TYPICAL MONADNOCK.



TYPICAL SMALL KOPJE OF PINK GRANITOID GNEISS OCCURRING
AS OUTLIER OF ABYSSINIAN ESCARPMENT.



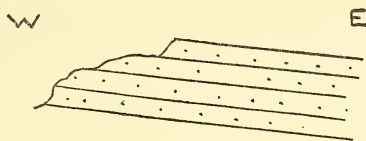
JIMALE : THE UPPER SANDSTONES.



DAUA VALLEY, NEAR MUDDO.

Although a considerable search has been made, off and on, during a period of over three years, very few fossils have been found. A few were found near Jimale on the western outcrop and are at present being identified. The occurrence is worthy of note, and their determination is awaited with interest.

The topography of these rocks is characteristic, as they form typical table mountains, possessing the characteristic



scarps with flat plateau tops; sometimes they are gently inclined and have long dip slopes. These are very noticeable in the Marehan country. Another interesting feature amongst the sandstones is the Eil Wak basin, containing gypsiferous beds. These were first noticed and described by Dr. J. Parkinson. This area consists of a soft, greyish-white calcareous limestone containing numerous spear-shaped crystals of gypsum varying in size to five or six inches long. This is overlain in parts—noticeably to the north—by a hard, unfossiliferous, white limestone. In spite of numerous searches no fossils or even traces of them were found.

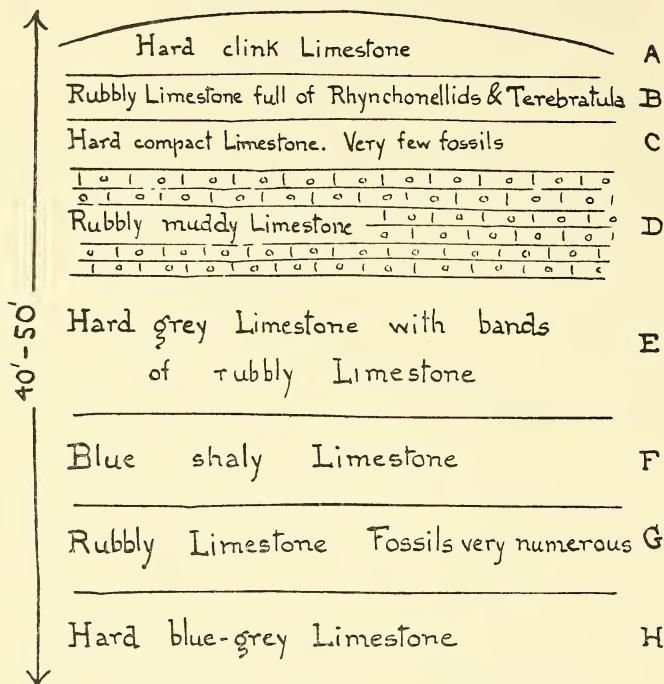
The basin has a diameter of approximately twenty miles, and is surrounded by sandstones, with a possible outlet to the S.E. The area is characteristic of a desiccated salt lake, and is probably part of a much larger lake, as suggested by J. Parkinson (cp. *Abs. Proc. Geological Soc.*, No. 980, 1915).

The area is valuable as it contains over 100 wells which are tunnelled down to approximately 30–40 feet deep. The water is highly prized by the Gurre, who own them, owing to its remarkable saline properties.

THE LIMESTONE SERIES

These are characteristically developed on the Daua River, where they consist of hard unfossiliferous limestones intercalated with muddy limestones and shales.

The first typical section examined was at Muddo Erri on the Daua River and the following sequence was noted.



DIAGRAMMATIC.

This section is of further interest, in that the beds seem to have undergone gentle flexuring, as many of the fossils found showed marked signs of crushing.

In bands B and G many fossils were found which are awaiting identification. The fauna is very suggestive of the Mediterranean facies in Jurassic times.

Further sections were studied in various places, but those found on the Juba, particularly at Salugli, are worthy of brief notice here. The sections are small and contain practically only muddy limestones and shales. In the latter, remains of ammonites were found which are of great interest, as they must be similar to the remains of ammonites found by J. Parkinson on the other side of the river at Kukatta (cp. *Abstr. Geol. Soc.*, No. 980, 1915).

Mention must also be made of the profuse numbers of belemnites to be seen on the caravan track which runs north of Serenli at Mata Warseisa. They are of a sulcate form.

CONCLUSION

On the completion of the identification of the various fossils found, the exact age of this large development of sedimentary rocks should be determined.

For the moment it is submitted that the narrow coastal strip of sediments broadens out and extends to at least $40\frac{1}{2}^{\circ}$ long. E. These run northward across the Dawa River, probably without interruption, through Italian Somaliland to British Somaliland. The writer visited the latter place about a year and a half ago and was much struck by the similarity in lithological features of the Bihendula and Dawa limestones. There was also a marked similarity in the sulcate ammonites found.

Economically these rocks might prove of value as a source of oil, but this would seem to depend largely on the results of the investigations recently carried out at the Daga Shabell oilfield in British Somaliland. It is noteworthy that the Shabell sandstones have been identified as Jurassic age.

GEOGRAPHICAL VARIATION IN EAST AFRICAN BUTTERFLIES. PART II

BY K. ST. A. ROGERS, F.E.S.

NYMPHALIDÆ

Most species of *Precis* are more interesting for seasonal than for geographical variation. It is true that the African forms of *P. orithyia* and *P. hierta* differ to some extent from the Oriental species, and form races of those species which are generally smaller and darker, but that is only to be expected. There is, however, one species, *P. elgiva* in East Africa, which is a form of the western *P. terca* which has some

interest. The former has a narrower, central fulvous band across both wings than the latter, whereas, in most cases, the western forms differ from the eastern forms in their more extended dark markings. *P. terea* reaches as far as Londiani, but in Nairobi *P. elgiva* is found, and shows no tendency to approach the type form. It seems, therefore, that this is another case in which the Rift Valley forms the boundary between the two races.

Hypolimnas (Euralia) dubius is particularly interesting from the point of view of geographical variation. The western form exists under two forms, *H. dubius*, with black, white-spotted fore-wings, which mimics *Amauris*, such as *A. psyttalea*, and *H. anthedon*, with large, white patches on the fore-wings, which mimics *A. navius*. These have been proved by breeding to belong to one species, though the models are perfectly distinct. In East Africa, also, the species exists under two forms similar to the two western forms, namely *H. mima*, corresponding to *H. dubius*, and *H. wahlbergi*, corresponding to *H. anthedon*. The latter has very much larger, white patches in both wings than *H. anthedon*, precisely as *A. dominicanus*, the eastern subspecies of *A. niavius*, has larger patches than its western representative. However, *A. psyttalea* only extends into the Nyanza province of Kenya, and in the rest of the country there are two other species of *Amauris*, i.e. *A. echeria* and *A. albimaculata*, which resemble each other so closely that they can only be separated on close examination, and both extend to the western parts of Uganda. In both these species the white spots on the fore-wing are much smaller than in *A. psyttalea* and its allies, and it is a remarkable fact that *H. dubius mima* also has the spots on the fore-wing much smaller than in *H. dubius*; so that the two forms of the same species on coming into East Africa vary in exactly the opposite direction, one by an increase in the white markings and the other by a decrease. In the region around Victoria Nyanza all forms seem to be found and no doubt intermediates occur; but in the forests near Nairobi the eastern forms alone are found, though they are not common, and they also occur together in the Ukamba and Teita countries, but in the coast district,

during many years collecting, I never met with the *mima* form, though the *wahlbergi* form was much commoner than elsewhere in the colony; and it is significant that the model of this form, *A. albimaculata*, is also absent from this district, and that as soon as it is found, i.e. in the Teita district, *H. mima* also appears. I do not think that it will be of importance to go into the small differences which exist between the races of several other butterflies of this group, as they require careful comparison in order to be appreciated. However, the genus *Pseudacræa* contains species in which the difference is marked. *Ps. boisduvalli* is a red and black species which is a well-known mimic of the western *Acraea egina*. The eastern form *Ps. trimeni* does not, however, resemble *A. areca*, the eastern form of *A. egina*, so closely as it resembles *A. acara*, the eastern form of *A. zetes*; in both species the eastern forms are characterised by the greatly extended red markings, but in *A. acara* there is a conspicuous subapical orange bar, not present in *A. areca*, which is generally found in *Ps. trimeni*. At the same time it should be remarked that the latter is very variable in East Africa, and some specimens approach the western form somewhat closely. The eastern form extends only as far as Nairobi, and is often less rare than the western form.

Charaxes pollux.—The eastern form *gemimus* differs from the type form in the presence of yellow submarginal lunules on the hind wing. It is to be found on the Taita hills and on Kilimanjaro, whereas the type form persists unchanged from the west coast as far as Nairobi.

Charaxes protoclea occurs as far east as Kavirondo, and is replaced in the coast district of Kenya by *Ch. azota*, which has a wider marginal border of orange in the male, and a much broader white central band in the female.

The western *Libythea laius* also reaches Nairobi, but is replaced on the coast by the very similar *L. labdaca*.

LYCÆNIDÆ AND PIERINÆ

Many of the Lycænidæ run very close together, and seldom exhibit much geographical variation as regards western and

eastern forms. However, *Telipna carnuta*, which is found as far east as Uganda, is replaced in the coast district by *T. rogersi*, with more extensive orange-brown markings, and *Myrina silenus*, which reaches Kavirondo, is replaced at Nairobi by *N. ficedula*, which is a common species as far as the east coast and also South Africa.

The Pierinæ are more remarkable for local and seasonal variation than for geographical races, and there is also a great deal of individual difference, so that with our present knowledge it is not easy to recognise geographical variation in most cases. Perhaps the clearest case is that of *Mylothris narcissus* of the Taita hills, which is replaced at Nairobi by *M. jacksoni*.

PAPILIONIDÆ

Papilio rex of Nairobi is replaced in Uganda by the form *mimeticus*, which is darker, and on the west by the form *schultzei*, which is quite without the red mark at the base of the fore-wing. In Kavirondo there occur intermediates.

P. dardanus is very interesting from the point of view of geographical variation as it is for its mimetic forms. There are forms with non-mimetic females in Madagascar and Abyssinia. Besides these the races recognised are *cenea* from South Africa, *tibullus* from the east coast (hardly separable from *cenea*), *polytrophos* from the escarpment in Kikuyu, and *dardanus* from Uganda westward. At Nairobi the form is *tibullus*, probably influenced by intermixture with *polytrophos*. The western males have only two or three large submarginal black spots on the hind wing, but those from the coast of Kenya have a very wide black submarginal band, which is much less pronounced at Nairobi, though it is very variable. On the other hand the *Hippocoon* females have the outer half of the hind wing black on the west coast, but on the east coast the black band is very greatly reduced, following the model *Amauris niavius*.

This is one of the clearest cases known, as it is most improbable that climatic conditions should result in less black in one sex and more black in the other sex of the same species.

It will be noted that in the large majority of the species

mentioned there is a progressive diminution of the black or fuscous markings from the west to the east, but there is much difference in the distance penetrated by the western forms, some stopping at the lake and others reaching Nairobi.

DEATH'S-HEAD MOTH IN BEEHIVE

(To the Editor)

The following notes may be of interest to members. A swarm of bees have taken up their abode in my house, which is a wood and iron building. The bees have got in between the wooden wall of the dining-room and the outside iron. Exactly opposite the nest is a sofa, where I usually sit and read in the evenings. From my seat I can distinctly hear all that is going on in the bees' nest; the bees keep up a buzzing sound, which ranges from a high-pitched squeak to a booming roar. One night a most unusual noise started up under the eaves and proceeded to the nest. At first I was unable to guess what it was—it sounded like a bat or large moth fluttering about. This noise started every night at 7.30 P.M. and had been going on for a week. I put a strong light outside, shining on to the wall, and waited till the visitor came out, which I found it did in a place where I might, with luck, catch it. After a short wait I could hear it coming; then, as it came out, a lucky sweep with the butterfly net got him; it was a ♂ death's-head hawk moth. Shortly after the ♀ came out and I got her too. Both specimens were nearly perfect, in spite of the knocking about they had received in struggling up and down in the narrow partition in the wall. On opening their bodies I found they contained about a teaspoonful of honey each. I showed these moths to a native bee fundi, who said at once that he knew it, and that it fed on bees. His idea was that it 'caught the bees and ate them,' and he explained 'that the moth eats half the bees in the hive, then the other half fly away and leave the hive.'

One thing seemed very curious, and that was that the bees appeared to be frightened and made no noise while the moths were feeding on the honey.—R. E. DENT.

NOTE ON THE OCCURRENCE OF PODOCARPUS
TREES NEAR NAIROBI

By H. M. GARDNER

Just outside Nairobi, on Thompson's estate near the junction of the Ngong and Dagoreti roads, is a very interesting group of trees which probably few people have noticed, and of which still fewer have realised the significance. There are only about twenty-five of these trees scattered over an area of about fifty acres, in the angle between the Kirianugu stream and the Dagoreti road. In addition there is one solitary tree and a few seedlings on the edge of the Forest Reserve, exactly at the junction of the roads, and I am told that there is one other specimen about six miles away, on the Mbagathi River, some distance above the old camp. The trees are apparently identical with *Podocarpus gracilior*, but the remarkable thing is that there are no other *P. gracilior* trees within a hundred miles. The nearest are probably on the northern end of the Aberdare Range.

These trees are not recent importations : one is probably at least 150 years old. There is no trace of this species in the neighbouring forests, either in the Ngong Forest on the one side, or the French Mission Forest on the other. Therefore they can scarcely be the remnants of a formerly much larger area of this species. A perplexing feature is that the trees, which are of very varying ages, bear large crops of fertile seed and regenerate themselves in a wonderful manner. I have seen not less than 15,000 seedlings at one time beneath one tree alone, but these all get destroyed by natives cultivating shambas. In view of this great reproductive power, why has the species not become distributed over a much greater area and spread into the neighbouring forests? It must imply that the species has not been established in the locality for a very long period. Possibly the oldest of the existing trees is one of the original ones, and all the other trees in the neighbourhood have descended from it; but as has been stated above, this tree appears to be not less than 150 years

old, and the question as to where it came from and how it got there still remains.

Many thousands of seedlings have been raised by the Forest Department from the seed of these trees, but it is feared that the original group will disappear, as the land on which they stand has been sold for residential sites.

The dimensions of the largest tree are $10\frac{1}{2}$ feet girth at breast height, and 80 to 90 feet in height, and the altitude of the locality is about 6000 feet. In other districts *P. gracilior* is usually found at considerably higher altitudes.

It has been reported recently that there is a similar *Podocarpus* on the Ithanga Hills and on Donyo Sabuk. If this is correct, it may be that the Nairobi *Podocarpus* is not *P. gracilior*, but a new, closely-allied species which grows in hotter, drier localities than the true *P. gracilior*. But this would not solve the riddle as to how the isolated group of *Podocarpus* came to be growing on the Dagoreti road.

THE EAST AFRICA AND UGANDA NATURAL HISTORY SOCIETY

ANNUAL REPORT FOR YEAR 1921

The year under review marks a period of transition in the affairs of the Society, and the closing months of 1921 should be looked upon as the real starting point of its activities as an Institution worthy to take its place with other scientific bodies of the world.

It had long been evident that the rented building in which the Society housed its collections was far too small to allow of a proper display of exhibits, and that an increase of accommodation was a necessity. It was a step in the right direction when, at the last Annual Meeting, permission was given the Committee to enter into negotiations with the landlord for an extension of accommodation.

These negotiations, however, proved abortive, and the Committee, after careful consideration, decided that all funds available for building purposes should be devoted to the erection of the first block of a permanent Museum on the Society's plot.

Arrangements were accordingly made with Messrs. Harrtz and Wood to this end. It was found that the funds available were not quite sufficient to meet the cost of the building as specified, and these two gentlemen most generously offered to advance the difference between the money on hand and the actual cost of the building at ordinary bank rate. The building was put in hand in July, and was sufficiently far advanced by November to allow of a transfer of the Society's collections. A considerable saving on the cost of the building has been effected by the generous donation by Mr. Hutchinson of all lime and sand needed in the building, and by the very great reduction in price of timber conceded to the Society by the Equator Saw Mills.

Exhibits.—The activities commenced at the latter part of 1920 were indefinitely postponed pending removal into the new building, and no new work was undertaken. Since the removal, however, work has progressed, and several additions have been made to the Small Mammal and Bird collections, whilst the Insect exhibits have also received attention.

Curator.—Mr. A. F. Gedye acted as Curator from January to May, and during his period of office particular attention was given to the various collections of Insecta, and various groups which had been submitted to experts at home for identification were gone over and incorporated in the cabinets.

During the removal, and for a period of a month, Mr. R. L. Harger very kindly gave his services, and it is largely owing to his efforts that the exhibits were safely transferred and rearranged.

Publications.—One Journal was published during the year, of reduced bulk, and without illustrations. It is a matter for regret that this curtailment has come about, but it was necessary to keep the cost within the limits of the funds available. It is hoped that this state will be rectified in the next number of the Journal. No donations to the Illustration Fund were received during the year, and we would take this opportunity of once again bringing this Fund to the notice of members.

It must not be forgotten that the Journal is practically the only link which country members have with the Society, and it is incumbent on those more favourably placed to see to it that the Journal is made as attractive as possible.

Members' Meetings.—It is to be regretted that no members have volunteered to give lectures, and it has been impossible to arrange ordinary meetings accordingly.

General Remarks.—The Society is still without Government recognition, but we have hopes that this will be rectified in the near future, especially so in view of the fact that the Society's collections are used by members of Government Departments. The Small Mammal collection has been of considerable help to the Medical Department in determining the distribution of certain rodents suspected of being implicated in the spread of plague; furthermore, there is little doubt but that the Museum will become a teaching centre, and as such should be in receipt of State aid.



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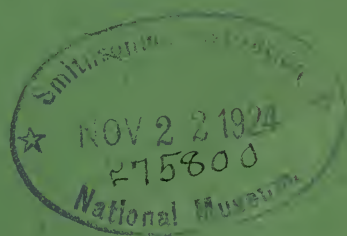
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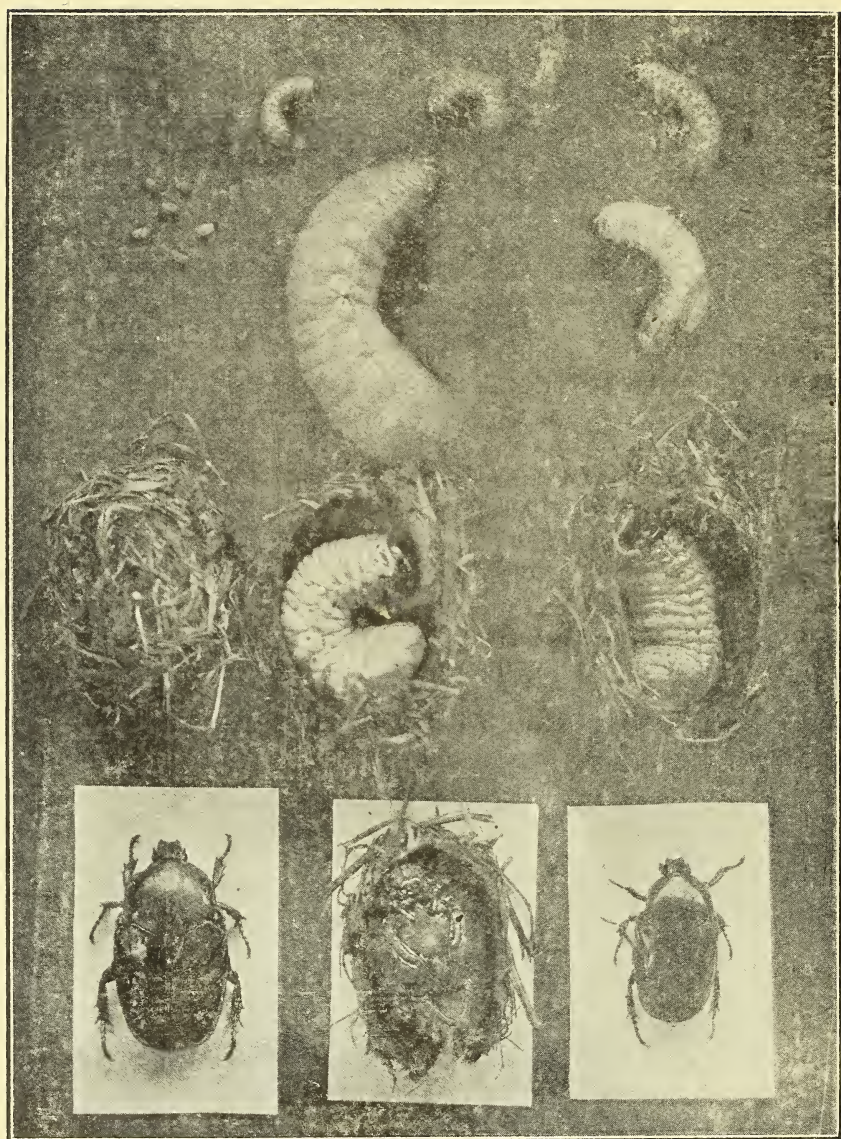
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THE BLACK ROSE CHAFER.

(*Diplognatha silacea*, Macl.). Nat. size.
Stages in the life-history.

NOTES ON THE LIFE HISTORY OF
THE BLACK ROSE CHAFER (*Diplognatha silacea*, Macl.)

by

V. G. L. VAN SOMEREN, F.E.S.,

and

J. WESLEY HUNT, F.E.S.

(*Illustrated.*)

This is perhaps the commonest of all the Rose-beetles in Nairobi and vicinity. It is a member of the great family Scarabeidae and belongs to the sub-family Cetoniinae.

The fully mature insect is a beautiful glossy black all over, and although varying considerably in size, may be considered a fairly large insect (average 30 x 15 mm.) (*vide* plate.)

They do a vast amount of damage to roses, eating the young shoots and flowers, particularly the half-formed buds.

They are also of economic importance, in that they suck the juices of fruit trees, such as Apple, Plum, and Peach, selecting such spots on the bark as have become injured through abrasion or bites of other insects. Although the extraction of small quantities of the juices does not necessarily endanger the life of the tree, yet such a wound almost invariably becomes the focus of infection by other coleoptera or flies which deposit their eggs in the damaged tissues. Such an area frequently sloughs out, or leaves a wound which forms a suitable site for fungoid infection. Ripening fruits are also attacked.

The indigenous trees or shrubs on which we have found the adult beetle feeding are: *Croton elliotanus*, *Warburgia ugandensis*, various species of *Solanum*, *Hibiscus*, *Abutilon* (on stems and flowers), and on various *Albizzia*.

These insects are sluggish in their movements and do not readily take flight, but when actually disturbed they drop straight down, and when within a few inches of the ground they then take wing.

The breeding grounds of these beetles, though sought for on many occasions, remained undiscovered until quite by accident a large breeding colony was found. The site was an old grass thatch placed on the top of a corrugated-iron roof. This thatch had been in position for about a year and as a result of the recent rains had become sodden

and much delapidated. It was during the process of "trimming" that adult Cetonids were noticed emerging from between the grass bundles. On investigation, a very large number of eggs, larvæ in various stages, and pupae were found in the layers of the thatch.

A section of the thatch was removed layer by layer, and the conditions under which the insects lived, carefully noted.

Observation showed that the eggs are deposited under the more decomposed layers of the grass, and that the larvae, when hatched, penetrate to the deeper layers, where they feed on the sodden grass.

During the process of feeding, a large amount of excreta is passed and collects under the grass. It was noted that within these masses of excrement there were numerous tunnels, and when these were opened up, larvae were found resting in a terminal chamber. It is suggested that these tunnels are used as retreats during the intervals of feeding.

The excreta is elongate and very like that of rats, and observation of such droppings in a thatch might suggest the presence of rats in these situations. (*Verb sap.*)

The fact that larvae in all stages of growth were found at one time would indicate that the breeding season extends over a prolonged period, and that the whole life cycle takes a considerable time for completion. A captive female has been observed to lay over a period of a month, and during this time to have been impregnated by the same male on several occasions.

The various stages in the metamorphosis of these insects are illustrated in the accompanying plate, and are detailed below.

Egg.—Oval, cream white, with a uniform matt surface, and strong integument. Eggs under observation hatched in 12-16 days.

Larva.—When newly emerged the larva is 3.5 mm. long, translucent greyish in colour, and fairly active. Twelve well marked segments are present. Growth is rapid, but the colour does not change until the later instars are reached. Except when actually walking, the larva adopts a curled up attitude.

In appearance the adult larvae are clumsy, fleshy grubs, more or less cylindrical in shape, except towards the anal end which gradually becomes thickened. In this stage the colour is creamy white except at the eleventh and twelfth segments, which present a blackish appearance owing to the excrement in the alimentary canal.

The head is reddish brown. The shield is semi-circular, with a triangular mark, on the median part, composed of depressed lines. The apex of this triangle is deeply depressed. There are twelve deeply depressed punctures, the largest of which are situated immediately above the base of the antennae; two smaller ones between these and the

sides of the triangle and six within the triangle, four running along the base and two across the median part. The antennae which are red-brown in colour are five jointed (including the basal socket). The fourth joint has an angular projection on the lower surface.

The thorax consists of three segments, the first of which has an elongate orange-brown chitinous patch, at the apex of which, there is a white spot bearing a single hair. Within this patch is an oval depression. This chitinous plate occurs on the anterior lateral surface and a single spiracle on the posterior lateral surface of this segment. Segments two and three have no spiracles. Each segment carries a pair of light orange-brown legs.

The abdomen consists of nine segments, the first eight of which have a single spiracle on the lateral surfaces. These spiracles are surrounded by an orange-brown chitinous disc, indented on the anterior edge, slightly raised in the centre, and thickened on the posterior edge.

There is a fairly broad compressed subspiracular ridge running along the lateral surface from the first to the twelfth segments and joining with the anal aperture. This ridge is folded at the extremity of each segment, giving to the whole a wavy appearance.

The whole of the thorax and abdomen are sparsely covered with short brown hairs.

Average length of adult larva, 51.7 mm.; width of head, 6mm.; greatest width of thoracic segments, 7.5 mm.; greatest width of abdomen, 15 mm.

When the larva is full fed, it proceeds to construct its cocoon, which consists of short bits of grass cemented together with excreta. The cocoon is lined with excreta passed by the insect during the process of constructing its cell. This passage of excreta causes a general contraction of the entire insect with a resultant increase in opacity. The process of lining the cell was observed in the following manner: a fully fed larva was secured and placed in an empty cocoon which had both ends cut away. The larva adopted the cell readily and proceeded to repair and seal up the broken ends. Excreta was passed inside the cell towards one of the openings, the larva then turned round and commenced to press and consolidate the mass with its head, and reversing its position smoothed the lining with its truncate tail-end. The process of defecation and pressing of the excreta was repeated until the openings were entirely sealed.

A further experiment was tried: a suitable larva was secured and placed in a box. Unfortunately the receptacle was knocked over and the larva found its way into a cloth lying on the table. The whereabouts of the larva was not at first known, and it was not until

a day or two after, that using the cloth, one discovered the insect within its folds. A complete cocoon had been made, constructed entirely of excreta passed by the insect.

Prior to casting the larval skin, just before pupation, the larva becomes more contracted and assumes a pinkish colouration; the anal end becomes markedly crenated. The length of the larva in this stage is only 23 mm.

Pupa.—When the larval skin is cast, the pupa is at first white, subsequently turning to a light orange-brown. The pupa shows the outline of the perfect insect. The wing and elytra cases are curled over the lateral and on to the ventral surface of the abdomen, and are supported along the upper and lower edges by the mid and posterior pairs of legs. The head is depressed ventrally and supported on either side by the anterior pair of legs. The antennae, which are remarkably short, are curved downwards. Length of pupa, 25 mm.; width, 16.7 m.m.

The pupal stage of insects kept under observation, at room temperature, lasted six weeks. When the beetle first emerges it is light orange brown on the upper surface and orange yellow on the venter of the abdomen. The elytra remained soft for twenty-four hours, and did not change to a jet black colour until two days later. The thoracic integument remains brown for another 48 hours.

THE ORIGINS OF THE GALLA AND SOMALI TRIBES.

By JUXON BARTON, M.A.

The origin, language, customs, characteristics, and habits of the Galla and the Somali present so many points of similarity that an attempt to give a historical account of the origins of one necessitates some detail of the other.

The Galla, probably one of the most ancient of races now existing, may be regarded as the parent of the Somali tribe, and as such first come under consideration.

THE GALLA.

"On taking a general survey of the racial history of Africa," says Dr. Haddon, "it is manifest that the critical area is the North-Eastern region which abuts on Southern Arabia," geologically but a short time has elapsed since Africa and Asia were joined, paleolithic

implements similar to those found in the Congo have been found in Somaliland, and in short, there are good grounds for the belief that the principal races of Africa crossed from Southern Asia.

The Galla, or as they call themselves Oromo (the sons of men), have had various origins ascribed to them, and the word "Galla" is that used of them by the Abyssinians and Arabs. Dr. Ludwig Krapf states that this word means "to go home," and Miss A. Wernher has recently suggested the Galla words of farewell *Agum ngalla* corroborates this statement. The Abyssinians however derive the Galla from an Abyssinian lady of rank who was given in marriage to a slave from Gurague to whom she bore seven sons who became dreaded robbers and the founders of tribes inhabiting the country about the River Galla whence they took their name. Moslem tradition has it that Galla are Meccan Arabs who settled on the East Coast of Africa during the *Wakt-el-Jahiliveh*, or Time of Ignorance, and that their name is derived from the reply of Ullabu, their Chief, to the summons of the Prophet calling on the tribe to accept Al-Islam, the messenger returning stated "He said 'No'" (*Gha la*)—an example of the Moslem love of philological analogy.

It is interesting, however, to note the similarity between the Galla word for both God and Sky, *Wak*, and the idol *Wak* of the pre-islamic pantheon at Mecca, of which the Kaaba alone survives; and again the Galla legend of a *Kitab* or Holy Book, to the loss of which they ascribe the fallen fortunes of their race. The Galla themselves aver that in the beginning of their history they crossed a great sea or lake, the Red Sea. A story of kingship and a coronation feast is told, and women, as in the early history of Arabia, have held princely rank.

Probably those Galla whose southward route lay near the East Coast of Africa and who are now found along the Tana River and in the neighbourhood of 'Witu are correctly described by Dr. Krapf as "more primitive" than those of Abyssinia whom he met during his activities there between 1838 and 1842, in that they are the relicts of the early migrants and had little contact with the races of Abyssinia. Incidentally Dr. Krapf, himself a German, described the Galla as the "Germans of Africa."

A theory as to the origin of the Equatorial Galla is advanced in the unsigned article "Gallas" in the *Encyclopædia Britannica*, which states:

"The home of the Southern Galla was possibly in a district East of Victoria Nyanza, for the tribes near Mount Kenya are stated to go on a periodical pilgrimage to the mountain, making offerings as to their mother."

The chain of causation is obscure.

Herodotus in 450 B.C. shows the horn of Africa and the countries Southward to the River Juba as inhabited by "Macrobians"; Erastotenes in 200 B.C. denotes the area "Cinamomifera Regio"; and Ptolemy in 150 A.D. shows "Barbaria"; Cape Gardafui as "Aromata Prontus"; the interior as "Myrrhifera Regio," the coast hinterland as "Azania," a Latinised form of the Arabic *Ajam* used in conjunction with the word *bar* to denote a non-Arab country.

It is probable that shortly before or in early Christian times there was a migration of pastoral Hamites from Asia into Eastern Africa abutting on Asia, the Galla preceding. This migration was contemporary with that of the peoples designated by Sir H. Johnston as "Red Sea Kushites" (Hadendowa, Danakil, etc.) and was a little to the Southwards.

Thence, by reason of pressure from fresh immigrants the first comers were forced to seek new pastures, either in the West between the forest and desert near the great rivers, or Southwards towards the mountains of Eastern Africa.

Paulitschke, following Tellez in the XVII. Century, Hiob Ludolf and James Bruce, in writing of the Galla in Abyssinia, gives the date of their arrival in that country as about 1537, and their starting point to have been South of the Gulf of Aden and states that they were still in the region opposite to the Gulf in the XIII Century.

The old Arab Sultanate of Zeyla, founded it is said, in the VII. Century, had become a powerful State by the XIII. Century, A.D., and embraced a large number of Galla converts under its rule, until the mixed race which resulted broke it up into a number of petty emirates under Galla-Somali chiefs.

It is certain that between 1528 and 1540 A.D. armies of Mohammedans, under Mohamed Gran (or *Granye*, the left handed), a Somali, conquered a large part of what is now Abyssinia. Portuguese intervention was sought and a fleet arrived in 1541, 400 musqueteers under Christopher da Gama, a brother of the Admiral Vasco, took the field, at first with success, but eventually they were defeated and their leader executed. Ultimately Mohamed Gran was routed in 1543 by the Portuguese. These campaigns had wide-spread effect on the stratification of peoples in this region.

During the Portuguese occupation of the East Coast of Africa the Galla were the most powerful tribe between Abyssinia and Mombasa and were thought to extend far to the South, they even besieged Jesus Fort in Mombasa and were practically suzerain over the semi-Arab petty sultanates in the Lamu archipelago. In 1824 Captain Owen, in charge of a charting expedition, notes the Galla settlement near Witu. In 1843 when Dr. Krapf was expelled from Abyssinia he heard a rumour at Aden of the equatorial Galla, and on Christmas Eve

of that year, accompanied by his wife and travelling in a native dhow, he anchored at the mouth of the Juba River; the next day he reached the Island of Koyama, the most northern of the Dundas Group, and had "the very great pleasure of meeting with the Gallas of the tribe Dado."

The Island of Koyama is said to have been peopled from Kismayu owing to the Galla raids on that port. But on the other hand some of the islanders claim to be descended from the Garreh, a semi-pagan tribe, closely allied to the Galla-Somali group and inhabiting part of the coast near Merca in Italian Somaliland and the country about Dolo in the north of the Kenya Province of Jubaland. Again a Koran in one of the mosques on Koyama Island shows a pedigree of a present-day family for some ten generations; in this, first may be noticed pagan Galla nomenclature, next plain Islamic names, later at about the height of the ivory and slave trade the titles of "Haji" and "Said," and finally the present-day return to ordinary Moslem names. An aged baobab tree on the mainland directly opposite to this Island also bears numerous tribal marks identified by Galla as peculiar to themselves which the islanders state were carved by their progenitors before they crossed from the mainland.

The Galla then originated in Central or Southern Arabia, crossed the Red Sea, penetrated into the foothills of Abyssinia, turned South, leaving substantial settlements of their blood behind them, and were driven to their last outpost along the Tana River by conflict with the Somali, a race which they had helped to found.

THE SOMALI.

The Somali, Sir Richard Burton has characterised as "nothing but a slice of the great Galla nation Islamised and Semiticised by repeated immigrations from Arabia."

The Somali belong to the Eastern Hamitic family of which the chief members are the Galla and Afar, the Abyssinian Ajan, and the Beja tribes between the Nubian Nile and the Red Sea. They, or rather the Galla, their progenitors, have been identified with the people of Punt, and it is said that they were known to the early dynasties of Egypt. Somalis since their conversion to Islam are prone to regard themselves as pure Arabs, but in spite of geographical propinquity the influence of Arabia has been very slight even upon the Somali language, the structure and vocabulary of which is essentially Hamitic with marked affinities to the Galla and Afar tongues. The Somali is not however a pure Hamite and the physical characteristics of the race show signs of interbreeding with Galla, Afar, Abyssinians, Bantu, and negroes.

The origin of the designation Somali is in considerable dispute. The Abyssinians shortly derive "Somali" from the Ambaric

Soumahe, an unbeliever. Another theory is given by Dr. Drake Brockman, that a Hindu, Ram Nag, a trader on the coast of Somaliland, married a Galla woman by whom he had a son Somal, so called on account of his father's wealth, and that the son had a daughter Donbirro who married Darod the son of an Arab Jiberti bin Ismail, and from Darod a number of Somali tribes do in fact claim descent. There would not seem to be much to recommend this theory of a Hindu trusting himself among the savage Galla tribes, as from accounts of the annual fairs of Berberah it appears that the Indian traders came but once a year and sat in their boats while the merchandise was placed on the sea-shore by the Galla.

Professor Friedrich Ratzel seems to support Dr. Drake Brockman's theory when he speaks of a legendary Parsee immigration of about 500 A.D., which is said to have monopolised the trade of the country, and to which is attributed the ruins of fortified settlements, aqueducts, and cisterns showing undoubted traces of Indian influence. That there was contact between the coast of Somaliland and the Indian trader is certain, but that there was any attempt at colonisation seems unlikely merely from the structural similarity in buildings for the architectural influence of India is found in Arabia, and, after the Crusades, in England in the style known as Indo-Saracenic.

During the rule of the Ptolemies in Egypt and in the Byzantine period the Red Sea and the coast of Somaliland were explored to a certain extent, and it is said that the Greeks settled on the neighbouring Island of Socotra. The maps of Herodotus, Erasthenes, and Ptolemy have been noted in speaking of the Galla. Between the 12th and 18th centuries no less than six geographers mapped the coast line of the present Somali country, but it is not until 1815 that the name Somali occurs, when it was applied by Smith to the present Italian Somaliland.

Sir Richard Burton's quoted dictum of the origin of the Somali race is doubtless correct, and it remains to consider the influence of Arab immigration upon these people. The subject is obscured by the mass of fable and pretentious legend which has gathered around the semi-mythical personages claimed as ancestors by the Somali. Jiberi (Strong in Faith) bin Ismail bin Akil is supposed by Somali genealogists to have been a noble Arab from the Hedjaz, who, forced to flee from his country for political reasons, was shipwrecked on the Somali coast where he married a Hawiyah woman called Donbirro, by whom he had a son Darod. The Issak tribes of Somalis discredit Darod's origin and state that he was a Galla slave who stole the Prophet's slippers for which he was rebuked with "*Inna tarud na huu*—Verily we have rejected thee," hence Darod the Rejected.

Through Kablulla, Darod's son, descent is claimed by the Herti Somalis, whose principal branches are the Medjertain, Dulbahanta, and Wersengeli. Again, sub-dividing into innumerable septs, through Darod's second son are descended the Ogaden who have branched into the Mohamed Zubeir, Auliha, Magharbul, Habr Suliman, Abd Wak, Rer Abdulla, and Rer Mohamed; the last named three clans are now found near the River Tana. The Marehan Somalis are probably the most direct descendants of Darod. Somali tradition places the advent of Darod's father Jiberti bin Ismail, as two hundred years after the Hegira. From then onwards the families become less pagan, and in 1260 it is said that Said Yusuf El Bagdadi and Mohamed bin Yunis El Siddik, two Arabs came across from Arabia, subdued an infidel magician and settled among the Somalis.

In 1400 A.D. comes the almost certain descent of the Issak tribes from Sheriff Issak bin Ahmed. The story runs that he, with forty-four holy men from Hadramout, sat for four days on the hill Auliya Kombo in Somaliland planning the conversion of the country. The Issak Somalis aver that the documents proving this descent were stolen by Yemen Arab Sheriffs in order to discredit their noble origin. By Magaden, an Abyssinian woman, Sheriff Issak begat Gerharjia, Awal, and Arab, and, by a slave, Jalla, Sambal, and Rambar, all these sub-tribes prefix the matronymic *Habr*, though it appears doubtful whether a noble Arab would give his sons pagan names. The descendants of Sheriff Issak and the forty-four saints with their increasing number of proselytes so multiplied that about 1500 A.D. they drove the unconverted pagans to the West and South.

The nature of the country and its lack of grazing and water, forced the Somalis to follow in the wake of the Galla, and about 1840—1850 the Ogaden and Marehan crossed the head-waters of the Juba and encountered the Galla again. Ultimately the Galla were driven through Biskaya (the Place of Battles) to the Tana River where still a dwindling remnant of the tribe is found, to be followed closely by the Somali who is now moving Westwards to the Lorian Swamp.

To sum up this brief history of the Somali it appears that first came an exodus from Southern Arabia of various pastoral Hamitic peoples who crossed the Red Sea to the countries about Cape Gardafui. They then became tinctured by religion and intermarriage with Sinbad-like Arabs and thus formed the Somali tribes, destined to drive their fore-runners the Galla Westwards and Southwards, and to follow them, not for conquest but for grazing, until the present day.

The future of this intelligent, facile, inconstant, indolent, avaricious and complex people is full of interest; the Arabs have it that "God made Somaliland, then the Somali, then he laughed."

EVOLUTIONARY HISTORY OF FINGER PRINTS.

By W. W. C. BURGESS.

Mr. B. Wentworth and Professor H. Wilder have considered this aspect of finger print science very carefully. They say: Going back again to the most primitive case, where the surfaces (palmar and plantar) are covered with separate unit islands without definite arrangement there is much to suggest that the units themselves are modifications of the scales with which the bodies of typical reptiles are clothed, and which the earliest mammals still retained. At a later time the scales were lost over the rest of the body, but were retained in this modified form over the palmar and plantar surfaces, where they were eventually transformed into friction ridges.

The general arrangement of these ridges, the varying direction of their course over different areas, and especially the patterns, with their endless varieties, although they may seem at first to be entirely the result of chance, correspond, nevertheless, to a fundamental plan, which, like so many other problems of human structure, finds its explanation in Comparative Anatomy.

To begin with, the more primitive walking mammals, designed for life on the ground, and in burrows and clefts in the rocks, developed on the contact surface of each foot eleven raised pads or cushions, to bear the weight of the body and furnish the necessary elasticity; and in their modern representatives, like the squirrels, the mice, and the shrew moles, this condition is retained and may be easily studied. These eleven pads run across the paw in three transverse rows— (1) a proximal row near the wrist, (2) a middle row at the base of the digits, and (3) a terminal, or distal, row on the end joints of the digits. The proximal row consists of two pads, the thenar, on the inner or thumb side, and the hypo-thenar on the outer, or little finger side. The four pads of the middle row are placed just beneath the four intervals between the digits, and are conveniently called the interdigitals. The pads on the ends of the digits are naturally five in number, and are termed digital or apical.

These eleven pads are found to be surrounded by folds of skin, two, three, or four about each pad, and so arranged as to form a slight depression or pocket for the reception of the pad. At the points of contact of each two of the folds, they are prolonged to form a third edge, running away from the triangular pocket so that the whole structure, composed of the two edges which help to enclose the pad,

and the third edge, the prolongation away from the pad, makes a three pointed star, called a triradius. The region where these three folds meet is a DELTA.

The apical pads are peculiar in having but two deltas, while the folds coming up from them, and running towards the end of the digit, unite to form a large loop enclosing the pad.

All these surfaces, the pads, the folds, and the spaces between them, are covered with epidermic units, each with a sweat pore, and where they come into constant contact with external objects, as on the surfaces of the pads, they show the usual tendency to arrange themselves in rows and fuse into ridges. In mammals that walk on the ground the ridges on the pads run transversely across them, that is, in the direction best suited to cause friction and prevent slipping; but in certain animals that live in the trees, and are, in structure, part way between these terrestrial forms and the arboreal monkeys, the ridges upon the pads form themselves into concentric circles or ovals, the centre coinciding with the middle of the pad, where it is most elevated. This is the first appearance of true patterns, and it is interesting to note that they are in the form of whorls, and that they occur on all of the eleven pads.

The next step is shown in those monkeys which are wholly arboreal. Here the pads are reduced in height so that the palms and soles are nearly flat, and all parts of them come into contact with the tree boughs and other external objects. Thus the entire surface becomes covered with ridges, but, instead of running straight across, the newly added ridges retain the direction of the folds that originally surrounded the pads. Thus we now have, upon the flattened palmar and plantar surfaces, not a chance arrangement of ridges running in all directions, but a picture or drawing of the paw surface found in their terrestrial ancestors, with every detail of the pads and their surrounding folds. The pads are indicated by the patterns; the folds by lines and systems of ridges running at each point in the old direction, with the tri-radial and deltas as before. The flattening has simply removed the third dimension, and the relief has become a drawing.

As has already been shown, these ridged friction skin surfaces are of great functional importance to the smaller monkeys, where the ridges are large in proportion to the size of the animal and where their life continually depends upon the certainty of their grasp. When however, as has happened in the great apes, and in man, the body weight has become so considerable that skin ridges are of little value in grasping, their particular arrangement becomes of no account, and is allowed to degenerate. The patterns placed upon the raised cushions, and still of much value, in their whorled arrangement, in a little tree animal weighing ten or twenty pounds, are no longer any

better than ridges running straight across the palm, and are found in all stages of degeneracy or, more frequently, are entirely gone. Occasionally, however, a human palm may be found in which all the eleven patterns are present each in its proper position, and the five apical patterns, which still have some little use in handling small objects, are almost always present.

This sketch of the evolutionary history of the palmar and plantar surfaces is necessarily a brief one, but the reader is referred to the technical papers which, during the past dozen years, have elucidated this hitherto neglected subject, and put the history of the friction skin and its ridges on a plane with other departments of comparative anatomy. To those who prefer a rational explanation for such phenomena, and do not like to refer it all to chance, this explanation of the origin of the features found in the friction ridges may prove of interest.

PERSISTENCE OF PATTERN AND RIDGE CHARACTERISTICS.

The utility of finger prints as a reliable means of identification must be contingent upon the persistence through long periods of time of general form of pattern and of the details of the ridges constituting it.

The late Sir Francis Galton proved that the details of the ridges persist throughout the whole period representing the life of man, those found on the fingers of a new born infant being traceable on the fingers of the same person in old age and apparently effaceable only when after death, the skin perishes through decomposition: for example, the marks on the fingers of many Egyptian mummies, and on the paws of stuffed monkeys still remain legible.

The testimony of embryology (according to Professor Wilder) is strongly corroborative of the idea of persistence, for at the earliest stage of the human embryo at which ridge characteristics can be recognised they appear simultaneously over the entire palmar and plantar surfaces, covering it with a pattern quite of the adult type. This begins at about the fourth month of the embryo. The hands with each finger joint defined could be drawn in outlines within the limits of a copper cent, yet the palmar surfaces, of both palm and finger, bear already the very pattern which it is intended to carry through life. This method of the sudden and direct shaping of the final ridges, without a preliminary period with separate units is rather unusual, since generally, the embryo traces the important points in its evolutionary history, assuming in turn the successive stages. In some instances, as in the case of friction ridges, an organ, or set of organs drop out the earlier stages in the development and assumes at once the final form.

The persistence of ridge characteristics is continually being proved in our work here where natives are frequently found with very badly scarred or injured finger tips. It would seem impossible in many cases for a pattern to repeat itself, yet when the injury has healed (provided the sweat glands are not destroyed) the exact repetition of the original pattern reappears.

The finger print bureau is frequently called upon to identify a deceased person; sometimes when the body is mutilated, or in an advanced state of decomposition, or both. These conditions do not however, prevent a positive identification being made so long as it is possible to take reasonably clear impressions. The Central Finger Print Bureau at Nairobi has been established $4\frac{1}{2}$ years, and in that time over 107,000 persons have been identified by the finger print system, 800 of whom were identified after death.

A FEW NOTES ON BEES IN LUMBWA DISTRICT.

By C. M. DOBBS.

Various kinds of bees are recognised by the Lumbwa, who have different names for the different species. The following is a list of the names with a short account of the peculiar features of each. In each case the name is given in the plural:

(1) SEGEMIK.

This is the name applied to bees in general and in particular, signifies the ordinary bee which produces the honey of commerce. They are larger than the others and are provided with stings. Their natural nests are holes in trees but they go of their own accord into the native's honey barrels. These barrels (Moingonik) are made from the trunks of trees split in two and hollowed out. A honey barrel is filled in about a year. When full, the bees are driven to one side by smoke, and the honey is extracted. The principal month for swarming is January (Mulkul). These bees will, as a rule, go into any box that is placed in a suitable position and take quite well to an English bee-hive.

(2) KOSOMEK.

These bees are very small and rather like flies. They live in holes in the ground. These holes are very small and extremely hard to find. Only one bee can get in and out at a time. They are found in the bush country after the jungle has been burnt. They do not sting. The actual nest is not more than eighteen inches below the surface. The honey is no use commercially.

(3) LOLOSİK OR KULUMBENİK.

These bees also live in the ground, in very deep holes sometimes as deep as five feet. They are smaller than the Kosomek and like the Kosomek do not sting. They produce very little honey. I ate some of the honey once. It had a sort of scented flavour and I felt very unwell after it.

(4) İMEİK.

These bees live in trees, and do not sting. They are a little bigger than the Kosomek. They will not go into honey barrels.

The following are the Lumbwa names of the principal flowers and flowering trees and shrubs which are most sought after by the bees. I regret that I do not know the botanical names: *Lelwat*, *Cheptuyet*, *Chesimbolyet*.—These flower in the months of Iwatkut (April) and Mamut (May), and the honey is taken in Bake (June). *Kipkoskosit*, *Uswet*, *Tarotwet*, *Ungulinyet*.—These all flower in the months of Ngeyet (July) and Robtoi (August), and the honey is taken in Puret (September).

EAST AFRICA AND UGANDA NATURAL HISTORY SOCIETY.

REPORT FOR THE YEAR 1923.

The hopes of the Committee, as expressed in the Annual Report for 1921 and at the formal opening of the New Museum, that, as a result of the establishing of a permanent Museum, the progress of the Society would be more rapid than hitherto, have unfortunately not materialised.

The heavy drain on the Society's revenue, in connection with the repayment of the debt on the new building, has precluded the purchasing of urgently required fittings, and altogether put out of court the possibility of employing a paid Curator.

At the opening of the Museum, above alluded to, Sir Edward Northey (the then Governor) referred to the Society as one worthy of both Government and Municipal support. Unfortunately up to the present the Society is without recognition from either body.

During the year under review, the Society may be said to have existed but not progressed. The Committee has been powerless to carry out the many improvements urgently required and was compelled to adopt a policy of forced inactivity.

Through the generous help of a member one new show-case was purchased and installed, to accommodate the collection of Migratory Duck.

Certain members of the Committee undertook the duties of Honorary Curators, and considerable work was done to ensure the safe preservation of the exhibits on show and in store. Many specimens however, had to be destroyed for lack of proper storage.

The principal accessions to the exhibits have been the following: Several stone bowls and other implements from Njoro, presented by Major Macdonald; a generous gift of Coleoptera, most new to the collection, from the Rev. J. W. Hunt; about three thousand mounted Beetles with full data, from a member of the Committee; several migratory ducks, received in the flesh, from Major Buxton and H. J. Allen Turner (since mounted and exhibited). The preservation and display of these specimens has cost the Society nothing.

One Journal, of reduced bulk, was issued during the year.

The Society continues to receive, by exchange and gift, numerous publications from other Scientific Institutions.

No donations have been received towards the Special Building Fund or Illustration Fund.

The Financial Statement as presented by the Hon. Treasurer, indicates the difficulties under which the Society is at present labouring, and will continue to labour, until such time as the PUBLIC through the Municipality or the Government or both, supports an Institution which is conducted for the PEOPLE, for EDUCATION, and for SCIENCE.

Owing to lack of support, no evening Meetings could be arranged.

V. G. L. VAN SOMEREN,
Hon. Secretary.

The East Africa and Uganda Natural History Society.

BALANCE SHEET FOR YEAR ENDING DECEMBER 31st, 1923.

INCOME.		EXPENDITURE.	
	Shs. Cts.		Shs. Cts.
Members' subscriptions	2,832 17	Wages for Native Caretaker for 12 months	288 00
Visitors to Museum	303 80	Rent of Museum plot	60 00
Advertisements in <i>Journal</i>	150 00	Paid off loan (Hon. T. A. Wood)	1,000 00
Balance from 1922	—	Interest on loan	370 75
		Cost of <i>Journals</i> (Messrs. Longmans, Green)	833 61
		Postage on same	30 00
		Show Case	141 00
		Insurance on building	151 00
		Lighting	30 00
		Uniform for boy	68 00
		Petty cash	44 34
		Balance in hand	—
			3,016 70
			1,191 99
			4,208 69
Audited and found correct, J. TWELLS, Hon. Auditor.			
11/3/24.			
		BUILDING FUND.	
Dr.		Cr.	
Grant from General Funds for payment of instalment on loan to T. A. Wood,		Paid to T. A. Wood	1,000 00
plus interest at Bank rate		Interest on loan	370 75
Debit balance at 31st December, 1924		On loan from T. A. Wood	4,000 00
			5,370 75
J. WESLEY HUNT, Treasurer. V. G. L. VAN SOMEREN, Secretary.			

The Journal of the East Africa and Uganda NATURAL HISTORY SOCIETY.

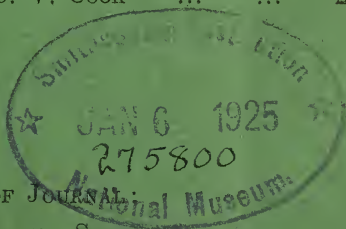
NOVEMBER, 1924.

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EDITOR OF JOURNAL
Dr. V. G. L. van Someren.



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The Journal of the East Africa and Uganda NATURAL HISTORY SOCIETY.

November, 1924.

No. 20.

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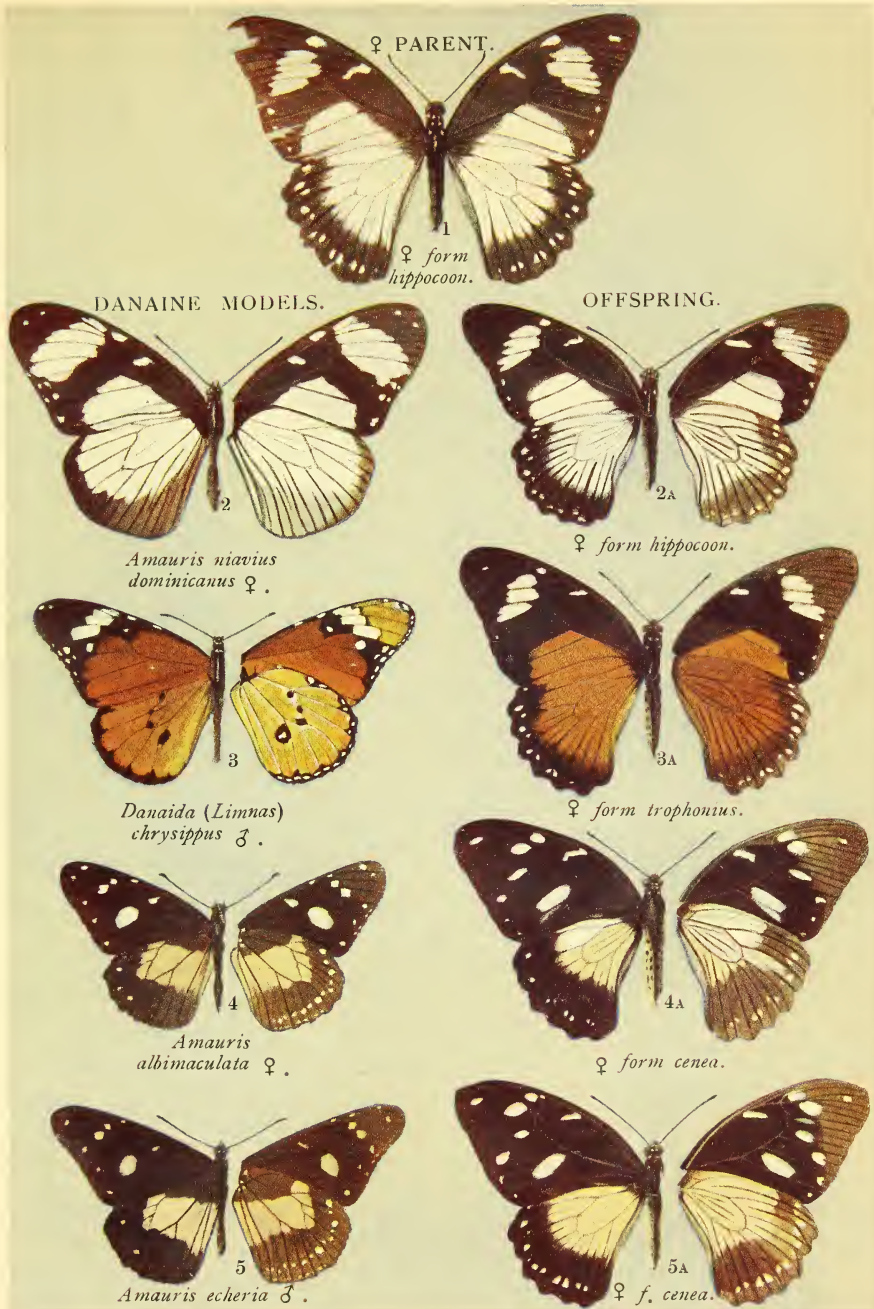
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DR. V. G. L. VAN SOMEREN.

PLATE I.
Frontispiece.



Mrs. P. P. Whelpley, pnx.

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All figures are about $\frac{2}{3}$ of the natural size.

Examples of the mimetic female forms of *Papilio dardanus*, subsp. *cenea*, bred in 1906 from a *hippocoon* form of female: Durban, Natal. The female parent and the Danaïne models from the same locality are also figured.

EDITORIAL.

As several members have expressed regret that the last number of the *Journal* was of such small bulk, it is perhaps advisable to explain the reason, and outline the recent decision of the Committee regarding the Society's publications.

At a meeting of the Committee held in July, it was considered advisable, that, in order to retain and stimulate interest in the Society, the *Journal* should be published more frequently. To attain this end, it was decided to print the *Journal* locally, and to issue it quarterly. As the funds of the Society are insufficient to issue a bulky number, every three months, it was agreed that each number should be of reduced bulk, the yearly aggregate to be equal to, or greater than, the old nine-monthly publication.

Journal No. 19 was the first to be issued under this new arrangement, and No. 20 is presented herewith.

We would take this opportunity of reminding members that the hopes of the Committee cannot be successfully attained without the ready co-operation of all.

Manuscripts on any Natural History subject of local interest are always welcome.

PAPILO DARDANUS.

THE MOST INTERESTING BUTTERFLY IN THE WORLD.

by

PROF. E. B. POULTON, F.R.S.

(Illustrated.)

Naturalists at Nairobi are fortunate in that they live in a district which is pre-eminent in the light that is thrown on the past history and origin of the varied forms of this most remarkable butterfly. The importance and interest of the Kikuyu and Nairobi examples will, however, be best understood if introduced by an account of the finished product, to which they supply essential preparatory stages. Of the three plates by which this account is illustrated (1) originally appeared in the Transactions of the Entomological Society of London (1908, pl. XXIII.) and is here reproduced by kind permission of the Council, while (II) and (III) were first published in the Proceedings of the Second Entomological Congress at Oxford in 1912. "Trans." and "Proc." with no further addition, except the year and page, refer to the publications of the Entomological Society of London. Nearly every note, or paper, quoted in the following pages can be consulted in the volumes of "Hope Reports" in the possession of the East Africa and Uganda History Society.

THE DISCOVERIES OF ROLAND TRIMEN.

Henry Walter Bates laid the foundation of the theory of mimicry in 1862 when his great memoir, with its curiously unrevealing title, "Contributions to an Insect Fauna of the Amazon Valley," was published by the Linnean Society (Trans., Vol. XXIII., p. 495).

A. R. Wallace, in the same Transactions (1866, Vol. XXV., p. 1) showed that Bates' interpretation of the complex resemblances between distantly related butterflies held good in the Oriental Region no less than in Tropical America. Finally Roland Trimen, in the same publication (1870, Vol. XXVI., p. 497) applied the theory to African butterflies and especially to the female forms of *Papilio dardanus*.

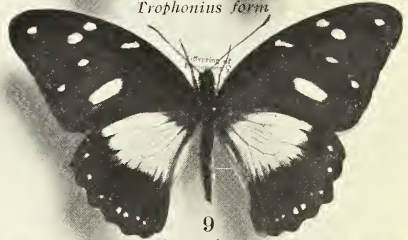
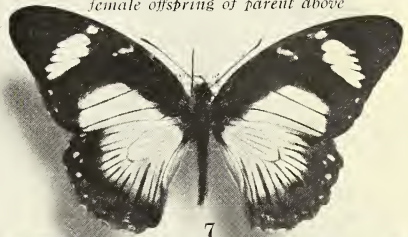
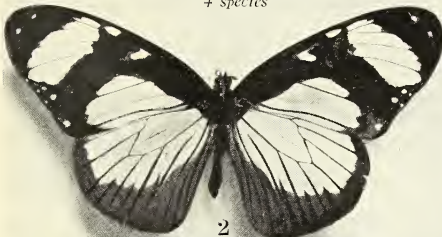
At the time when Trimen wrote this memoir the name *dardanus* was not recognised, the male butterfly resembling, but not exactly like the examples shewn on Pl. II., Fig. I., or Pl. III., Fig 3, being then known as *merope*, described from West Africa, by Cramer, in 1777.

PLATE II.



DANAINE MODELS
+ species

PAPILIONINE MIMICS
female offspring of parent above



Alfred Robinson, photo.

Nearly $\frac{2}{3}$ of the natural size.

Andre & Sleigh, Ltd.

Papilio dardanus cenea, the S. E. African Sub-species of *P. dardanus* with the four Danaïne models of its female forms. The proof by breeding that the mimics are one species. (Near Durban, Natal, 1906, G. F. Leigh.)

Later on it was found that this same male had been described and figured as *dardanus* in the previous year, by Brown. (III. Zool., p. 52, pl. XXII., 1776.) Although no locality is given, the excellent figure left no doubt that Brown's *dardanus* was described from a West African male, and that the name *merope* had to be sunk. Trimen was familiar with the South African form of *dardanus* and he also examined every specimen he could find in British collections. The result was always the same; the long-tailed swallowtail "*merope*" was always a male and there was no female to put with it.

Trimen similarly examined all the specimens he could find, of a tailless *Papilio* described by Stoll as *cenea* (Pl. I., figs. 4a, 5a, Pl. II., figs. 9, 10), a mimic of the Danaines, *Amauris albigulata* (Fig. 4 on Pls. I. and II.), and *A. echeria* (Fig. 5 on Pls. I. and II.). The examination of all the *cenea* (about 25) then known in collections revealed nothing but females.

Trimen next studied the fourteen specimens, then known, of the tailless *Papilio hippocoon*, described from West Africa by Fabricius, and later as *westermanni*, by Boisduval. The S.E. African form of this black and white butterfly is represented on Pl. I., figs. 1, 2a; Pl. II., figs. 6, 7, and its Danaine model *Amauris niavius dominicanus* in Fig. 2 on Pls. I. and II. Here too only females of *hippocoon* were found.

He finally passed in review the seven specimens, which were all he could find, of the tailless *Papilio trophonius*, described by Westwood, and suggested as the possible female of *cenea*—shewn above to be itself a female. *Trophonius* is represented on Pl. I., fig. 3a; Pl. II., fig. 8, and its Danaine model *Danaida chrysippus*, on Fig. 3 of Pls. I. and II. All seven were females.

In arriving at the conclusion that *cenea*, *hippocoon*, and *trophonius* were three forms of "*merope*," modified in mimicry of three Danaine models—an astonishing suggestion at the time—Trimen was aided by a consideration of the Madagascar *Papilio meriones*, Felder, with a male very like "*merope*" (compare figs. 1 and 3, Pl. III.), and a tailed female (fig. 2) whose pattern resembles the male except for a pronounced black mark starting at the base of the fore-wing costa and almost crossing the cell. Concerning this feature he wrote:—

"In the broad black costal bar of the fore-wings which distinguishes the female in Madagascar, regarded in relation to the hind-marginal black border, it is not difficult to recognise the material upon which natural selection might gradually work, to the ultimate production of a "Danaidiform" butterfly like *Hippocoon* or even *Cenea*. . . ."

How entirely this prediction is justified will appear in later pages; and, indeed, it was not without confirmation at the time, confirmation provided by a fourth form of female, *dionysos*, of which three examples in Hewitson's collection were known to Trimen. This female form, well-known but rare on the West Coast, is very variable in that very feature of the female *meriones* which Trimen recognised as the foundation of the mimetic pattern; and as Trimen points out, the three specimens of *dionysos* exhibited two very different degrees of transition in this respect between the *meriones* female and the mimetic *hippocoon*.

Trimen's conclusions were received with incredulity. Thus W. C. Hewitson wrote:—" *P. merope*, of Madagascar, has a female the exact image of itself; and it would require a stretch of the imagination, of which I am incapable, to believe that the *P. merope* of the mainland, having no specific difference, indulges in a whole harem of females, differing as widely from it as any other species in the genus "; and he went on to compare *merope* with certain South American swallowtails of which the sexes had recently been recognised, reducing four supposed species to two. Of these pairs, at length united, he said: " Though much unlike each other, there is quite sufficient resemblance not to shock one's notions of propriety." A little later Hewitson received from Rogers, his own collector, then in the Island of Fernando Po, *Papilio merope* and *P. hippocoon*, taken by him in copulation; another illustration of the saying that " truth is stranger than fiction." (E.M.M., Oct., 1874, p. 113.)*

My distinguished predecessor, Prof. J. O. Westwood, was also at first incredulous, but became convinced when he received from Mr. Mansel Weale, the males and some of the female forms bred from larvae feeding together in his South African garden.

I well remember as an undergraduate nearly fifty years ago, Prof. Westwood pointing out the extraordinarily interesting comparison between the Madagascar and the African females of *dardanus*.

I must not dwell at too great length upon the historical aspect of the subject, but the continental race of *dardanus* with male-like females demands some attention.

* For an account of the controversy see Trans., 1874, p. 137.

Many years after the appearance of Trimen's original Memoir, two additional races of *dardanus* with male-like females were described by M. Charles Oberthur (whose recent death is such a grievous loss to Entomological science)—*antinorii* in 1883, and *humbloti*, from the Comoro Islands, in 1888. The former is of the highest interest in relation to the evolutionary history of *dardanus* on the mainland of Africa. With two exceptions all the known females of *antinorii* are male-like. These two astonishing specimens were described and figured by Kheil (Iris., III., p. 335, figs. 1 and 2, 1890). Both are mimetic but differ from all other mimetic females of *dardanus* in the possession of long "tails" to the hind wings. The pattern of one, named *ruspinae*, much resembles that of the *chrysippus*-like *trophonius* or rather *trophonissa*, of the other, *niavoides*, that of the *niavius*-like *hippocoön*. Coloured representations of both are given by Dr. Eltringham in Figs. 4 and 8, Pl. X of his "African Mimetic Butterflies" (Oxford, 1910). (This plate is entirely devoted to the forms of *dardanus* and should be consulted in connection with the present paper.)

The most probable explanation of the presence of these two extraordinary specimens, is, I believe, that they are hybrids between the female *antinorii* and a wandering male from further south, carrying the factors for the females *trophonissa* and *hippocoön*. (Dr. van Someren's recent discovery of a form of *dardanus* at Marsabit, S.E. of Lake Rudolph, with *hippocoön*-like and *genea*-like mimetic females (Proc., 1924, p. xxv.) supports this conclusion, and suggests that collections from still further north, leading on into Abyssinia, would be of the greatest interest.) In one outstanding feature, the great size of the sub-marginal white spots of the hind-wing, the two specimens are alike, suggesting the probability that they were the offspring of the same female. Being unable to consult the paper at the moment, I have been kindly helped by Capt. N. D. Riley, who informs me that Kheil gives the locality as Korata on Lake Tana, and quotes Dr. Stecker's statement that the species was one of the commonest in the district, "so little shy that they could be picked off the flowers with the fingers." Nevertheless only four females were obtained—*ruspinae*, *niavoides*, and two male-like.

I have recently examined the females of *antinatorii* in the British and Tring Museums, and found to my surprise that in a considerable proportion of them, the tails are much reduced. In one female out of seven at Tring this reduction is accompanied by an extension of the dark mark beyond the cell of the fore-wing, conspicuously into area 2, slightly into 3. Two interpretations suggest themselves. The reduced tails and prolonged costal bar may be traces of earlier hybridization with southern races diluted by prolonged interbreeding with pure *antinatorii*; or these features may be due to the spontaneous appearance of variations such as that which led to the original development of a mimetic pattern. It is in favour of this latter hypothesis that M. le Cerf has recently described a Madagascar female in the Hill Museum, Witley, with a similar extension into area 3 on the undersurface (Bull. Hill Mus., Vol. I., No. 3, p. 379, Pl. I., fig. I.). He also describes on the same page a *meriones* female in the Paris Museum, with the right-hand tail reduced to a rudimentary projection, but as the left is normal I do not think that much significance can be attached to the specimen. There can be no doubt that such variations are extremely rare in the Madagascar race as compared with the Abyssinian. Extensive collections from various parts of Abyssinia and Somaliland would probably throw much light on this fascinating problem. *Antinatorii* is evidently common in the Goolis Mountains, to the south of Berbera, a locality from which my friend Sir Horace Byatt sent me a fine series of males, but unfortunately no females. The comparison of these Somali females, if they could be collected, with those from Abyssinia would probably be highly instructive.

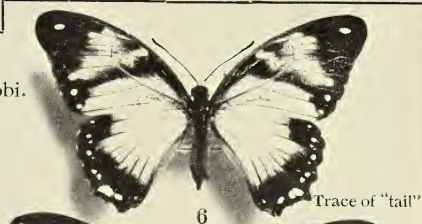
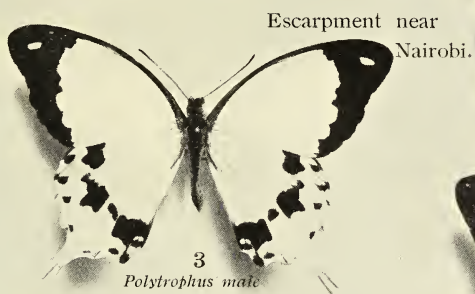
PLANEMOIDES, THE MIMETIC FEMALE FORM WITH AN ACRAEINE MODEL.

All the mimetic females hitherto mentioned resemble *Danaine* models, but a most interesting addition was made in 1903, when Dr. S. A. Neave recognised (Proc., 1903, p. xli.) in a collection made by Major Wiggins, C.M.G., at the N.E. corner of the Lake Victoria Nyanza, a female form mimicking the *Acraeina* butterfly *Planema poggei* (also a little further west, the male of *Pl. macarista*). This new form was named *planemoides* by Trimen in the same year (Proc. 1903, xxxviii-xl.), and was figured by Dr. Neave in Trans., 1906, Pl. X., fig. 8.

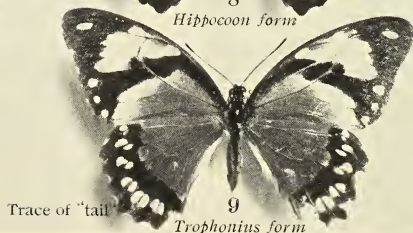
Planemoides and its model extend S.W. to Angola, and an Oxford specimen of the mimic bearing the label "Angola, Rogers: 1873" was probably received by Prof. Westwood from his friend Hewitson, to become thirty years later one of the types of Trimen's description. The other type, from the Kavirondo-Nandi district, has also been kindly presented to the Hope Collection by Mr. C. W. Hobley, C.M.G.

PLATE III.

P. meriones, with non-mimetic female : Madagascar.



6 *Polytrophus* females of 4 forms.



Alfred Robinson, photo.

Rather over half the natural size.

Andre & Seigh, Ltd.

The non-mimetic ancestor of *Papilio dardanus* (*merope*) from Madagascar, and transitional forms, shewing the origin of mimetic females, from the Kikuyu Escarpment, near Nairobi, British East Africa (6,500—9,000 ft.).

Indisputable proof of the soundness of Neave's and Trimen's inference that *planemoides* is one of the female forms of *dardanus* was obtained later on by breeding experiments, but before speaking of these and many others by which Trimen's original conclusions have been confirmed, it is necessary to describe briefly the distribution of the races of *dardanus* on the mainland.

THE AFRICAN GEOGRAPHICAL RACES OR SUB-SPECIES OF *P. DARDANUS*.

Five races in addition to *antinorii* are recognised by Dr. Karl Jordan (Zeitsch f. Wissenschaft, Zool. Bd. lxxxiii.). The distinguishing characters relied on are the black markings of the male hind-wing and the form of the male genital armature. Dr. Jordan concludes that these differences of form are not such as to prevent interbreeding along the line where the area of one race meets that of another, and there is strong evidence that such interbreeding takes place.

The following are the races distinguished by Dr. Jordan, to each of which I have added the commonest and best-known female forms:—

1. *Papilio dardanus cenea*, Stoll. S. Africa, northwards to Delagoa Bay, completely transitional into the next subspecies, both geographically and in racial characters. The male and chief forms of female are represented, with the models of the latter on Pls. I. and II. The *hippocoon* female of this and the next subspecies, differing from the West Coast form described by Fabricius, has been named *hippocoonoides* by Haase, the chief distinction being the larger white area on the hind-wing, in mimicry of the eastern race of *Amauris niavius*, which also has a larger patch than the western race and has been called *dominicanus* by Trimen.

2. *Papilio dardanus tibullus*, Kirby. Delagoa Bay northward to the Mombasa district. Westward it is completely transitional into *polytrophus* in the Nairobi area, and northwards probably into *dardanus*, the fused races spreading to the Abyssinian border and perhaps interbreeding with *antinorii*. Typically *tibullus* has by far the most heavily marked male of any subspecies. The female forms are very similar to those of *cenea*.

3. *Papilio dardanus polytrophus*, Jordan. Aurivillius defines the area of this race as the high-lying districts of the interior of Tanganyika Territory and Kenya Colony at the South and East sides of Victoria Nyanza, extending as far north as Kavirondo. The great majority of the known specimens are from the Kikuyu Escarpment and Nairobi. Typically it is a small high mountain form with a male having the pattern of the subspecies to the west of it, but the armature of *tibullus*, to the east. Such a male from the Kikuyu Escarpment (6,500-9,000 feet) is represented on Pl. III., fig. 3, and some of its female forms from the same locality in figs. 4-9.

At Nairobi it is larger and the males often far more heavily marked, due without doubt to interbreeding with *tibullus*. The female forms are extraordinarily variable and include wonderful transitional stages leading from the male-like female to the fully-formed mimics. They will be considered in detail in a later paper.

4. *Transitional*.—Dr. Jordan here places the forms from Uganda and especially its eastern border, which, in the structure of the male armature are transitional between the eastern and western races, although in other respects—size and pattern—similar to the latter. Aurivillius in “Seitz” does not separate these transitional forms from *dardanus dardanus*, the succeeding race.

5. *Papilio dardanus dardanus*, Brown.—The transitional forms spoken of under 4 gradually die away as we proceed westward in Uganda and Tanganyika Territory west of the Victoria Nyanza, being replaced by *dardanus dardanus*, a race which spreads to the West Coast from Sierra Leone to Angola. These western specimens are larger than those of the other subspecies, the superiority being especially marked in the Congo area. Dr. Eltringham has shown that the pattern of the males from Fernando Po approaches that of the male *meriones* of Madagascar on the opposite side of Africa (Proc. 1916, p. xciii.).

The predominant female form of *dardanus dardanus*, especially on the West Coast, is *hippocoon*. The western form of *trophonius* has been named *trophonissa* by Aurivillius, being distinguished from the eastern form by the greater extent of orange in the fore-wing and its entrance into the cell. It is everywhere present in the area of this race, but everywhere relatively rare. Not uncommonly the orange colour appears in the subapical fore-wing bar, so that all the markings are orange—the form *niobe* of Aurivillius. The corresponding eastern form named *salaami*, by Suffert, is rarer relatively to *trophonius* than *niobe* to *trophonissa*, the latter being probably benefitted by its resemblance to an *Acracine* model *Planema tellus*. The *cenea* female is common in Uganda, where its models, especially *Amauris echeria*, are abundant, enters the eastern fringe of the Congo forest, but disappears at some unknown point, before reaching the coast, although a model is known but apparently not commonly, on its southern tropical section.

Planemoides is one of the chief female forms of Uganda, extending with its model to Angola. *Dionysos* is the interesting primitive form mentioned as hitherto only known from the West Coast.

6. *Papilo dardanus antinorii*, Oberth.—This race has been already sufficiently dealt with except in one point. The males are more lightly marked than in any other subspecies, in this respect approaching most closely to *dardanus dardanus* and *polytrophus*.

It is important to remember that each of the races 1—5, interbreeds with its neighbours in adjoining areas, as is clearly proved by the intermediate forms abundant along the common boundaries and often spreading far beyond them. Similarly a female form such as *planemoides* characteristic of one race and mimicing models found in the area of its distribution, may pass, by interbreeding, well into an area of another, where, far removed from its model but probably reinforced by fresh invasions, it may persist as a rarity.

It has been already pointed out that *antinorii* too, probably interbreeds with the race to the south of Abyssinia, and that the two extraordinary tailed mimetic-females may perhaps have originated in this way.

FAMILIES BRED FROM KNOWN FEMALE FORMS OF DARDANUS IN VARIOUS PARTS OF AFRICA.

It will be convenient to review the breeding experiments which have been conducted with parents from different races, following the order already adopted, but deferring *polytrophus* and omitting *antinorii* in which such experiments have never been made.

1. *Breeding experiments with the South African P. dardanus cenea*.—

The first experiments of this kind ever made with *dardanus* were those of G. F. Leigh, beginning in the year 1902, when he bred three *hippocoonoides* females, twenty-four *cenea*, and eighteen males from a *cenea* female taken "in cop." with "*merope*" near Durban (Trans, 1904, p. 677, Pl. XXXI.). Later he bred several families from the same female form, as also from *hippocoonoides* and *trophonius*, nearly always obtaining a majority of *cenea* among the offspring and sometimes only this form. In 1923, however, he bred a majority of *hippocoonoides* in one family, while Miss Fountaine in 1909 obtained nineteen *trophonius*, two *cenea*, and sixteen males from the eggs of a *trophonius* female taken near Durban (Proc., 1912, p. cxxxiv.).

One of the most striking of G. F. Leigh's families, from a *hippocoonoides* parent is illustrated on Pl. I., showing the female parent and each female form present in the offspring, together with its model from the same locality. Of these females three were *hippocoonoides* (fig. 2a), three *trophonius* (fig. 3a), three *cenea*, with white spotted fore-wing (fig. 4a), five *cenea* with the chief fore-wing spot pale ochreous (fig. 5a). The same specimens are shown uncoloured on Pl. II. This interesting family, which included fourteen males of which one is represented on Pl. II., fig. 1, is described and figured in Trans., 1908, p. 434, Pl. XXIII.

Many families of the S. African race were bred in 1913 by C. F. M. Swynnerton at Chirinda in S.E. Rhodesia: Seventeen families from *hippocoonoides* parents yielded males and females like the parents; two from *cenea* parents, one from *trophonius*, and one from a form recently named *natalica* by M. le Cerf, all yielded males and a mixture of *hippocoonoides* with females of the parental form (Proc. 1914, p. lvii.). These results and W. A. Lamborn's in S. Nigeria (vide p. 13) strongly suggest a mendelian interpretation, the common *hippocoonoides* form being recessive and presumably mating most frequently with a male carrying factors for the same female form, the three rarer female parents, heterozygotes, (or hybrids), each combining its own dominant form with the common recessive *hippocoonoides*. Such females mating with the common form of male carrying factors for *hippocoonoides*, would give the observed mixture of female offspring (Proc., 1914, p. lvii-lxx.).

These conclusions were confirmed by Swynnerton's later experiments at Chirinda (Proc., 1919, p. xxx.). The fact that *cenea* is much the commonest female in Natal and the S. coast of Cape Colony is explained by the abundance of its models, and the rarity or entire absence of the black and white *Amauris niavius dominicanus*. At Chirinda, the black-and-white model is common, but much less so than the model of the *cenea* form, and the far greater effect of the former upon the proportion of the female forms is probably due to its extreme conspicuousness.

It is to be noted that the locally predominant form may be a Mendelian recessive, as *hippocoon* or *hippocoonoides* in most parts of Africa, or a dominant, as *cenea* (over *hippocoonoides*) in Natal and Cape Colony.

2. *Breeding experiments with the East African race P. dardanus tibullus.*

A hitherto unrecorded family received from W. A. Lamborn at Tanga, was reared from eggs laid by a *hippocoonoides* female, and contained, as at Chirinda, only females of this form and males. z

3. *Breeding experiments with the race P. dardanus polytrophus, at Nairobi.*

It has already been explained that the extraordinarily interesting breeding experiments of Dr. van Someren and Canon St. Aubyn Rogers at Nairobi will be considered in a future paper. It is, however, appropriate to point out that the Nairobi race of *dardanus* is by no means pure *polytrophus*, but often contains a strong element of *tibullus*, as is proved by the heavy marking present on the hind-wing of so many males.

4. *Breeding experiments with the transitional race of P. dardanus in E. Uganda, Etc.*

Two interesting families bred by Dr. Carpenter were reared from eggs of females taken in eastern Uganda and just south of it. The first, in 1912-13, from the eggs of a *planemoides* female captured on Bugala Islands in the Sesse Archipelago, Victoria Nyanza, yielded twelve males, seven *hippocoön* and three *planemoides* females, the latter bred for the first time (Proc., 1913, p. liii.; Trans., 1913, p. 656, Pl. XXXIX.). The second, in 1915, from eggs laid by a remarkable female combining the patterns of *planemoides* and *trophonissa*, taken near Kakindu Hill, 30 miles west of the Victoria Nyanza, and a little south of the Uganda border, yielded six males and two females, one of which was *planemoides* and the other *trophonissa*, the western form of the East Coast *trophonius*. The female parent thus produced the two constituents of its pattern (Proc., 1915, p. lxxxvi., *vide* also p. 9 of this paper).

It may be mentioned here that other, although much less extreme, instance of the fusion of two patterns are well known. Thus the *cenea* offspring of *trophonius* may exhibit traces of their parentage in the richer, redder tint of the hind-wing patch, and in modifications of the pattern (Trans., 1906, Pl. XVII., figs. 8 and 11, and description). Similarly, when bred from *hippocoönoides*, the *cenea* offspring may exhibit marked paleness in the same patch (Trans., 1908, p. 436, *vide* also Pl. I., fig. 4a of this paper). All specimens with such traces of fusion are probably heterozygotes exhibiting imperfect dominance, and would split up into their constituents in the later generations.

5. *Breeding experiments with the West African race, P. dardanus dardanus.*

Seven families were bred in 1911-13, by W. A. Lamborn in the Lagos district of S. Nigeria. All the parents were *hippocoön*, by far the commonest form on the West Coast, and the female offspring were of the same form. The seventh family, reared in 1913* contained besides fifteen males, nine *hippocoön* and eight *dionysos*, the latter an interesting and primitive form, well-known but always rare on the West Coast, and bred for the first time on this occasion.

The comparison of these two female forms in the same family provides strong indirect evidence of the influence of selection. The pattern of the nine *hippocoön*, resembling the well-known model, *Amauris niavius niavius*, is constant; that of the eight *dionysos*, unprovided with a model, extremely variable, ranging from a specimen like the type figured by Doubleday and Hewitson in which the oblique bar crossing the fore wing is altogether absent, through a graduated series to one in which it is well developed.*

* Proc., 1914, p. lxiii. The parent, 17 female offspring and one male, are represented on Pl. 1 of Proc., Linn. Soc., London, 1915-16. The parents of all female offspring of the first, fourth, and fifth families are shewn on Pl. XI. of Trans., Ento. Soc., 1913, and Proc., 1912, pp. xii. and cxxxi.

THE EVOLUTION OF THE MIMETIC FEMALES OF "PAPILIO DARDANUS":

Further reference to *dionysos* as a primitive form, in addition to that already mentioned (pp. 6 & 13), was made by Trimen in 1874 (Trans., p. 148), and nearly a quarter of a century later he drew attention to a far more significant specimen in the Hope Collection at Oxford—a female form of *tibullus* collected by Lt. Turner at Zanzibar in 1884. Comparing this with *dionysos* he describes it as "a much closer approximation to the masculine colouration. . . . The transverse trace of black in the fore-wing is even fainter . . . and the colour of the wide pale spaces and the hind-marginal spots in all the wings is almost exactly the pale creamy-yellowish tint of the male. . . . There can be no doubt that in this specimen we have a marked case of reversion to the original colouring of the female, but it is unaccompanied by any inclination toward the recovery of the lost tail of the hind-wings." (Proc., 1897, pp. lxxxviii., lxxxix.; Trans., 1906, Pl. XIX., fig. 1.)

VESTIGES OF HIND-WING TAILS IN SOME PRIMITIVE FEMALES AND THE MOST ANCESTRAL MIMETIC FORMS.

In the address from which I have just quoted, Trimen also expressed the reasonable hope that other transitional females would be discovered "at some point in the wide territories between Abyssinia and Zanzibar" (p. lxxxviii.). Only three years later the prediction was abundantly verified by the late W. Doherty, who made a large collection of female forms of *dardanus* on the Kikuyu Escarpment (Sept.-Nov., 1900, at 6,500-9,000 ft.). The great majority of these specimens are in the Zoological Museum at Tring, but a good series exists also at Oxford and at the Hill Museum, Witley. The most primitive of the Oxford specimens, the type of the female form *trimeni*, originally figured of the natural size in Trans., 1906, Pl. XVIII., fig. 1., is here represented on a reduced scale in Pl. III., fig. 6. It will be observed that there is a distinct trace of a "tail" to the hind-wing, and it is especially interesting to note that such rudimentary tails are more commonly found in *hippocoön* and *hippocoönoides* than in any other mimetic form.

In other words the ancestral rudiment is most frequently found in association with the most ancestral of the mimetic patterns.

That this is the most ancestral and most easily derived from a male-like pattern such as is borne by the Madagascar female will be made clear by comparing figs. 2, 6, 7, and 8 on Pl. III.

Two West Coast *hippocoön* in the British Museum possess rudimentary tails (Trans., 1906, Pl. XIX., figs. 2 and 3) which are especially prominent in a specimen from Gaboon, and in Lamborn's and Swynnerton's breeding experiments the artificial conditions appear to have often caused slight but distinct reversion in this female form. Out of Lamborn's six families, two included several *hippocoön* with these traces (Trans., 1913, Pl. XL., figs. 10, 15, 17, 21). One of the families was artificially cooled in the pupal state, but it is uncertain whether this condition produced any of the effect. Still more significant was Lamborn's seventh family mentioned on page 13. In this family none of the *hippocoön* offspring exhibited traces of a tail which nevertheless were slightly indicated in some examples of the more primitive form, *dionysos*. Here too Lamborn exposed some of the pupae to cold but there was no evidence of any effect.*

My distinguished friend Prof. van Beinnmelen of Groningen has contended in his interesting papers on the origin of the patterns of Lepidoptera, that these tail-less mimetic females, of tailed males are not derived from a form like that of the male, or the tailed female of Madagascar, etc., but are descended, unchanged in this respect, from the tail-less ancestor of the tailed Swallowtails. The facts mentioned in the preceding paragraph are very difficult to reconcile with such a hypothesis, and a discovery of Lamborn's furnishes a complete refutation. He has recorded that "the pupal wing-cases are the same in shape in both sexes, but whereas, in the male, the tails are readily visible on either side of the mid line on the night before emergence, in the female the space for their reception, though present in an equal degree, is unoccupied by wing-tissue." (Proc., 1914, lxvii.).

It will be observed that the vestigial tails often associated with primitive patterns and colours provide strong evidence against the conclusion that the two Abyssinian females with long tails and fully-developed mimetic patterns (p. 7) are ancestral or in any way represent stages in the evolution of the mimetic females of *dardanus*.

† The sex of the future butterfly can be ascertained by an examination of the wing-cases by the aid of transmitted light, from about the fourth day, if development is proceeding normally.—(Editor.)

* During recent experiments, it was found that in cases where the pupae had suffered a severe shock just when the larvae had changed to pupae and were still soft, the resultant butterflies showed distinct traces of male pigmentation varying from a small patch of yellow, to complete male colouration of one, two, three or all the wings. Also, that in cases where there was only slight male pigmentation, tails were present.—(Editor.)

THE PALE YELLOW PIGMENT OF THE MALE DARDANUS PROVED
TO EXIST IN THE PRIMITIVE FORM OF FEMALE.

Dr. E. A. Cockayne has shewn that the yellow colour of the male *dardanus* is due to a special pigment wide-spread in both butterflies and moths and one which can always be recognised by its fluorescence (Trans., 1924, p. 1). The parts of an insect's wing containing this pigment shine with a brilliant faintly bluish light, suggestive of moonlight, when exposed in a dark room to the dark ultra-violet light-rays, most conveniently obtained by the use of a mercury lamp.

Such parts stand out in startling contrast against the dark background of the other pigments of the wing. Although the chemical constitution of this pigment has not been determined it is certainly a definite substance; for it can be dissolved out of the wing by acetic acid and the solution fluoresces like the dry substance.

At Dr. Cockayne's suggestion and with his kind help, the pale yellow pigments of the primitive females of *dardanus* were tested, and Trimen's conclusions entirely confirmed. The yellow pigment of the female fluoresced like that of the male and is evidently the same chemical substance. When it has been transformed into white as in *hippocoön*-like females, or darkened into orange-brown as in *trophonius* and *trophonissa*, it is no longer the same substance and entirely ceases to fluoresce (Proc., 1921, p. xcix.).

In the note referred to above it is recorded that the pale-spotted *cenea* from the Kikuyu Escarpment fluoresced, while the very slightly darker pigment of the same forms from the lower elevation of Nairobi was non-fluorescent (*vide* also Cockayne in Trans., 1924, pp. 7 and 8). Later researches on the splendid material received from Dr. van Someren and Canon Rogers, has however shewn that fluorescent *cenea* commonly occur at Nairobi and in families bred from Nairobi parents, but it is still probable that such specimens occur in larger proportions at the higher elevation. Rogers has observed that the paler, more male-like, presumably fluorescent pigments of *cenea* appear in the pupa later than the somewhat darker non-fluorescing pigments of the same form, thus supporting the conclusions suggested by the physical test, that the two substances, although closely similar to the eye, are essentially different.

Until Dr. Carpenter conducted his experiments and twice bred *planemoides* from a known parent (p. 13), the only direct evidence that it is one of the female forms of *dardanus* was founded on a specimen taken in S.E. Uganda (1902) by Capt. T. T. Behrens, R.E.,

“ the specimen was on the left side a gynandromorph, portions of the male markings and scattered patches of scales being, as it were, let into the female pattern (*vide* footnote, p. 15). When the butterfly is placed in the path of the ultra-violet rays, the little yellow patch, however small, shines out like a star on the dark background of the non-fluorescent female pattern.” (Trans., S.E. Union Sci. Soc., 1923, p. 73; also Trans., 1906, p. 297, Pl. XVIII., fig. 4.)

FURTHER ANCESTRAL ELEMENTS IN TRIMENI AND OTHER PRIMITIVE FEMALES OF DARDANUS.

The oblique black bar produced by the lengthening of the outer end of the costal mark in *meriones* (of Pl. III., figs. 2, 6, 7, 8) has already been mentioned. In the most ancestral *trimeni*-like form named *dionysoides* by Aurivillius, the mark is unlengthened as in the most primitive, and, as it happens, the type form of *dionysos*. The West Coast form may in fact be briefly summed up as follows: A fore-wing of *hippocoön*; a hind-wing of *trophonissa*, but with a paler tint. The developing parts of the pattern of both *trimeni* and *dionysos* have cloudy edges (dyslegnic) different from the comparatively sharp outlines (eulegnic) of *hippocoön*.

Another ancestral feature of the pattern of *trimeni*, often retained by the fully mimetic females, is the trace of the two more or less complete gaps in the black band which is the most prominent feature of the male and un-modified female hind-wing. One of them is opposite to, but a little lower than the root of the tail, and between gap and tail is the largest pale area outside the black band; similarly occupying a corresponding position in *trimeni* and other primitive females, and often also in the mimetic females, is the largest pair of pale markings in the black border. Furthermore, the strong development of the whole series of these pale markings in the primitive females, *e.g.*, Figs. 7 and 9 of Pl. III., is clearly a much less reduced remnant of the area outside the black band of the male than that seen in the mimetic females, *e.g.*, figs. 7-10 on Pl. II. The fact that these markings are paired is due to the internervular streak passing through the remnant of pale ground-colour in each space and cutting it into halves, as is most clearly seen on the under surfaces shewn on the right side of figs. 2a-5a, on Pl. I.

Traces of the other gap, nearer to the costa or front edge of the male hind wing, are clearly seen on the under surfaces referred to above (*vide* especially figs. 2a and 4a) and on the upper surface of the *trimeni* shown on Pl. III., fig. 6.

THE EVOLUTION OF THE HIPPOCOON-LIKE FEMALE FROM TRIMENI.

It is now convenient to discuss the origin of each of the mimetic forms from the transitional females of the Kikuyu and Nairobi districts, following in the first place the order of figs. 2a-5a on Pl. I. The evolution of *hippocoon* will have already become clear from the previous account and the comparison of figs. 2, 6, 7, 8 on Pl. III. It will, I think, be convenient to speak of the transitional forms leading to it, but retaining the fluorescent yellow of the male, as *protohippocoon*, which will therefore include *dionysoides*, *trimeni*, and any other variety retaining the male yellow pigment and bearing a pattern intermediate between the Madagascar female and the black-and-white mimetic form.

THE EVOLUTION OF THE TROPHONIUS-LIKE FORM LAMBORNI.

The Kikuyu female figured as *trophonius* on Pl. III., fig. 9, is a *trimeni* with the chief pale yellow area, continuous from fore to hind-wing, almost completely over-spread with an orange flush. The specimen figured is seen to bear a vestigial tail, entire on the left side, broken on the right. All the pale colour is fluorescent. This form, which is well known in the Nairobi district and also occurs rarely in Tanganyika Territory, as far south as Kilosa (Proc., 1922, p. xlii.) has been named *lamborni* (Trans., 1917, p. 335). It bears the same relation to *trophonius* and *trophonissa* that *trimeni* bears to *hippocoon* and *hippocoonoides*; and it, and any of its varieties, which may be described as *protohippocoon* with the orange flush over most of the chief pale area, may be conveniently named *prototrophonius*.

THE EVOLUTION OF THE CENEA FEMALE FORM.

The history of this form of mimetic female is more difficult to understand than that of *trophonius* or *hippocoon*, but figs. 6, 4, and 5 on Pl. III., studied and compared in this order, suggest the line of development. The hind-wing pattern is derived from that of *trimeni* (fig. 6) by a broadening of the black border, the pale yellow pattern at first remaining fluorescent (fig. 4), but losing this property as it becomes ochreous in the hind-wing and ochreous or white (in the form *acene*, Suff) in the fore-wing (fig. 5). The spots near the margin also become smaller in the final product (Pl. II., figs. 9 and 10). The position of the spots in the fore-wing can be seen fore-shadowed in the *trimeni* on Pl. III., fig. 6. The lower border of the chief oval spot becomes defined by a band-like growth of the black ground-colour from base to anal or lower angle of the wing, while the five spots next in size are completed by the ground-

colour invading the pale area along the edges of which they are more or less clearly recognisable in fig. 6. We thus arrive at such a primitive form of the *cenea* pattern as is represented on Pl. III., fig. 4, and from this pass by a change in the pale pigment to forms like Fig. 5. Forms of *cenea* which still retain, in any part of the pattern, the fluorescent yellow, may be conveniently called *protocenea*. At present these have only been proved to exist in the Kikuyu and Nairobi districts.

The possibility must not be lost sight of that such an example as *trimeni* as is shewn in fig. 6 may be a heterozygote, combining pure *trimeni* and some form of *cenea* or *protocenea*, and that the apparently foreshadowed fore-wing spots may not be truly ancestral. Such a view can only be confirmed or refuted by breeding experiments; but it is difficult to imagine how the patterns of figs. 4 and 5 could have arisen from one like fig. 2 except through a stage similar to that represented in fig. 6.

THE EVOLUTION OF THE PLANEMOIDES FEMALE FORM.

When I formerly discussed the development of this interesting form (Trans., 1906, pp. 293-7, Pl. XX., figs. 1-4) transitional varieties between it and *cenea* and between it and *hippocoon*, both from the N.E. of the Victoria Nyanza, were described and figured, also unfigured, a form combining the patterns of *planemoides* and *trophonius* (actually *trophonissa*), from Entebbe. It was argued that all these intermediates were probably "the result of first crosses between females of one form and males bearing the tendencies of the other female forms. We are compelled to believe that in later generations their female offspring would not remain intermediate, but would split up, in accordance with the Mendelian conception, into the parent forms; and we can thus understand the comparative rarity of intermediates." (*ibid*, pp. 295-6.)

The last mentioned intermediate, studied in 1906 from a beautiful drawing by Dr. Eltringham, was presented by him to the Hope Department and could thus be compared with two other examples taken by Dr. Carpenter at Kakindu, S. of the Uganda border. From one of these he bred, in 1915, the two female forms, *planemoides* and *trophonissa* (p. 12), thus confirming the conclusions arrived at nine years earlier.

It is in every way probable that the second intermediate, between *planemoides* and *hippocoon*, is also a heterozygote which would split up into its constituents in later generations; but as regards the first intermediate between *planemoides* and *cenea*, now known as *leighi*, further knowledge has proved that the conclusion was mistaken, that the form is stable over a vast area, extending

immensely beyond the range of *planemoides*, so that it is impossible to adopt the plausible interpretation of *leighi* as a hybrid between *cenea* and a male bearing the *planemoides* tendency, or *vice versa*. We are therefore driven to the hypothesis that the *leighi* form is a persistent definite stage in the evolution of *planemoides* (Proc., 1911, p. xli).

The *leighi* form which, as already explained, was first obtained from the N.E. corner of the Victoria Nyanza, and figured in Trans., 1906, Pl. XX., fig. 1, was four years later bred and captured in Natal. Eight specimens were obtained, most of them by G. F. Leigh, in 1910, and the form, although always proportionately extremely rare, has continued to appear (Proc., 1911, p. xxxiii.; 1912, p. cxxxv, 1913, p. vii).*

During the past year, 1923, Leigh has both seen it in the wild state and bred it. Nearly all the *leighi* forms have appeared always mixed with other Natal forms, in the families from eggs laid by *trophonius* females.

There can be little doubt that *leighi* arose from the *cenea* form probably with the addition of the pale, subapical, fore-wing bar of *hippocoon* or *trophonius*, or more probably retained from the ancestral *trimeni*. The other parts of the fore-wing pattern are nearly as in *cenea*, the chief difference being a shortening of the principal mark in area 2, and its growth downwards and outwards into areas 1a and sometimes also 1b. A tendency towards this growth is often to be seen in *protocenea* and *cenea* (e.g., Pl. III., figs. 4 and 5; Pl. II., fig. 9) although very faintly in the last figure.

The colour of all these fore-wing markings is the rich orange-brown of *planemoides*, and all that is required to produce the fore-wing of this latter form is the fusion of the oblique bar and all the spots except the sub-marginal into a single broad irregularly outlined bar. The apical spot, common to *cenea* and *leighi*, generally disappears while the other sub-marginal elements persist. A specimen of *planemoides* taken by a native collector in August, 1910, between Jilore and Malindi near the coast of Kenya Colony, supports

* The 1912 family containing *leighi*, and recorded on p. cxxxvi., is there spoken of as the second, but, as this form was bred three times in 1910, it must have been the fourth. A figure of the South African form of *leighi* is given by M. le Cerf on Pl. II., fig. 12 of his paper in Bull. Hill Mus., Vol. I., No. 3, p. 369. The author is mistaken in thinking that only three examples of the form are known. He agrees that the southern *leighi* corresponds to a stage in the evolution of *planemoides* in other parts of Africa (see p.).

the above interpretation. In this butterfly, presented to the Oxford University collection by Canon Rogers, the fore-wing bar is divided and thus approaches the pattern of *leighi* (Proc., 1911, p. xlii.). In the prolongation of orange along the inner margins of this specimen and the large size of the white patch of the hind wing, we probably witness the influence of the male parent carrying the factors of *hippocoönoides*, by far the commonest form of the female in this district (Trans., 1908, p. 499).

The hind wings of *cenea*, *leighi*, and *planemoides* have the same pattern, but the pale ochreous basal patch of the first becomes, sometimes darker, sometimes much paler, in fact nearly white, in the second, while in *planemoides* a pure white patch in mimicry of the *Planema* models is typical, and a darker one quite exceptional.

Following the lines already adopted, the *leighi* form and its varieties may be spoken of as *protoplanemoides*.

A SIMPLIFIED NOMENCLATURE FOR THE NON-SYSTEMATIC NATURALIST.

The origin and meaning of the forms of *dardanus* must certainly appeal to every naturalist who is interested in the problems of evolution; but the study is hindered at the outset by a complicated nomenclature, complicated indeed may be inferred from the fact that only a small part of its intricacy is here revealed. Thus many of the kaleidoscopic changes undergone by the pattern of the extremely variable female form *cenea* have received names and even the same form, when it appears in a different race, has been given a different name.

I have suggested in the preceding pages a simple and uniform modification of well-known names to indicate the primitive form from which each mimetic female arose; and, although from the strict systematist's point of view this procedure means further complication by the addition of synonyms, it is hoped and believed that the naturalist will be aided in his study of the subject.

In a somewhat similar manner, the various female forms in each race may be indicated by adding to each the initial letter of the race name. For this purpose race (4), founded on transitional characters in the male, may be disregarded, and the initial letters of the following employed—*cenea*, *tibullus*, *polytrophus*, and *dardanus*. The system of nomenclature, as applied to the principal form names, but capable of extension to others is as follows: Proceeding from the most primitive to the most specialised patterns:

- A. Mimics of the *Danaine*, *Amauris niavius*: (1) c, t, and p, *hippocoon* (= *hippocoonoides*), mimicking *A. n. dominicanus*; (2) d. *hippocoon*, mimicking *A. n. niavius*. Derived from a male-like female through t. and p. *protohippocoon* (= *dionysoides* and *trimeni*).
- B. Mimics of the *Danaine*, *D. chrysippus*: (1) c., and t. *trophonius*; (2) d. *trophonius* (= *trophonissa*). Derived from *protohippocoon* through t. and p. *prototrophonius* (= *lamborni*).
- C. Mimics of the *Danaines*, *Amauris albimaculata* and *A. echeria*: (1) c., t., p., and d. *acene*, mimicking the above *Danaines* with white spots in fore wing, completely transitional into (2) c., t., p., and d. *cenea*, mimicking the pale-ochreous-spotted form of *echeria*. Derived from *protohippocoon* through (p.) *protocenea*.
- D. Mimic of the *Acraeines*, *Planema poggei* and *P. macarista*: t., p., and d. *planemoides*. Derived from *cenea* or *acene* through c., p., and d. *protoplanemoides* (= *leighi*).

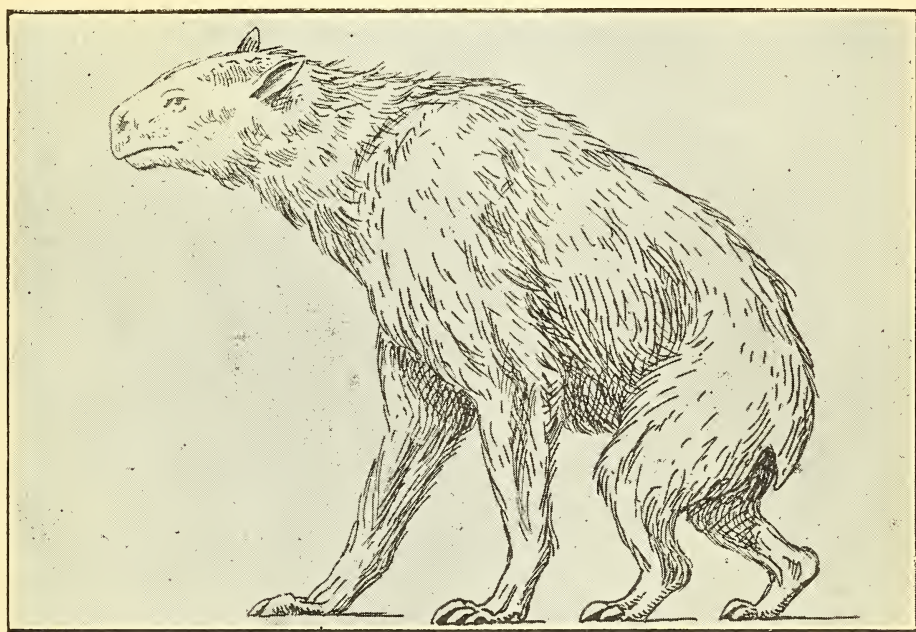
I have attempted in the preceding pages to give a condensed account of the chief forms of this most interesting butterfly and to trace the evolution of its mimetic females. In a future paper I hope to discuss the bearing upon this hypothetical history of the splendid series of families bred from known female parents at Nairobi by Dr. van Someren.

NOTES ON THE OCCURRENCE OF A SPECIES OF CHALICOTHERE IN UGANDA.

BY THE LATE C. W. ANDREWS, D.Sc., F.R.S. (British Museum).

In the number of *Nature* which appeared on November 10th, 1923, I published a short article entitled "An African Chalicotheres," giving an account of the discovery in the neighbourhood of Albert Nyanza of the characteristic toe-bone of one of these curious animals. The specimen was sent to the British Museum (Natural History) by Mr. E. J. Wayland, Director of the Geological Survey of Uganda and was accompanied by numerous fragmentary remains of Hippopotamus, Phacochoerus, Crocodile, Chelomans and Siluroid fish together with some fresh-water shells. The beds from which these specimens were collected are probably of Pleistocene age.

The Chalicotheres (*Ancylopoda*) are one of the most peculiar groups of Mammals: they actually belong to the Perissodactyla, the uneven-toed Ungulates, of which the horse, rhinoceros, and tapir are



RESTORATION OF *MACROTHERIUM MAGNUM*, LARTET.
After Abel (*Acta Zoologica*, 1 (1920), p. 59). About 1/30th natural size.

modern representatives, but instead of having hoofs they have developed enormous claws, the supporting bones of which are deeply cleft as in some of the Edentata. Indeed Cuvier regarded these claws as belonging to a giant *Manis* (*Pangolin gigantesque*), and it was not till 1888 that Filhol described a skeleton of a Chalicothere, called *Macrotherium magnum* from the French Miocene that it was shown that the teeth and skulls, which had long been supposed to belong to quite different animals, were actually parts of a peculiar clawed ungulate. Abel has recently published an elaborate account of the Chalicotheres and has given a restoration of *Macrotherium* which is here reproduced. The earliest known representative of the group called *Eomoropus* is found in the Middle Eocene beds of North America. In the Miocene various genera occur in France, Samos, and Pikermi, while in India and China remains are found probably as late as the Pleistocene. The extension of the range of the group into Africa, now recorded is particularly interesting. It will be remembered that in Samos *Chalicotherium* is found associated with *Samotherium* an animal closely similar to the Okapi, the discovery of which in recent years created such great interest. Since a Chalicothere is now known to have existed in this region there seems to be just a possibility that it also may have survived till the present day and may form the basis of the numerous stories of strang animals that have from time to time been published.

Mr. C. W. Hobley in a paper entitled " On some Unidentified Beasts " in this journal (vol. III., 1913, p. 48) gives a summary of some of the more notable of these stories of unknown animals. Perhaps the most striking of these occurrences are those recorded by Mr. G. Williams in a note " An Unknown Animal on the Uasin Gishu " (op. cit., vol. II., 1911, p. 123) and by Mr. G. W. Hickes in " Notes on the Unknown Beast seen on the Magadi Railway " (op. cit., vol. III., 1913, p. 53). In both cases the animal seen is described as a heavily built, bear or hyaena-like creature; a description which would agree in a general way with the restoration of *Macrotherium* illustrated.

It is to be hoped that every effort will be made to clear up this mystery, for if the animals should turn out to be a Chalicothere, the interest of the discovery would far surpass that of the Okapi. One or two bones of the toes would be quite sufficient to determine whether the beast was a Chalicothere or not, but of course it is desirous to get the whole animal.

NATIVE FOLK-LORE.

THE LEPRACAUNS TO KWA NGOMBE.

By S. V. Cook.

Fifteen miles east of Embu Station there rises from the Emberre Plains the lofty hills of Kwa Ngombe, nearly six thousand feet high. They are inhabited, the Embu natives say, by buffalo and a race of little red men, who are very jealous of their mountain rights. Old Salim, the interpreter at Embu, tells with great dramatic effect how he and some natives once climbed to near the top when suddenly an icy cold wind blew and they were pelted with showers of small stones by some unseen adversaries. Happening to look up in a pause in their hasty retreat, he assures me that he saw scores of little red men hurling pebbles and waving defiance from the craggy heights. To this day even the most intrepid honey hunters will not venture into the hills.

Of course this notion of fairies or little men is found in the folklore of most races. Allingham, the Irish poet, wrote a delightful poem on these people. One verse might have been written about these very Kwa Ngombe people:

Up the airy mountain,
Down the rushy glen,
We dare not go a-hunting
For fear of little men.

I hope that no intrepid reader of this journal will be tempted to explore Kwa Ngombe after reading this, for were he captured, a punitive expedition against the little men would be a most parlous undertaking!

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